

FACILITIES INSTRUCTIONS, STANDARDS, AND TECHNIQUES

VOLUME 1-3

REPORTS AND RECORDS

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Facilities Instructions, Standards, and Techniques
Volume 1-3
REPORTS AND RECORDS

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1. INTRODUCTION

The growing complexity of interconnected power systems requires increased emphasis on the analysis of system performance to ensure achievement of the best reliability for all system components commensurate with economic considerations. One of the most important requisites for such analysis is the availability of clear, concise, and accurate reports on power system operations and maintenance, for review by management at various levels.

The collection of large quantities of data is in itself of relatively little value, unless fast and efficient procedures are available for handling and summarizing the information. The advent of modern ADP (automatic data processing) equipment has made the attainment of that goal possible.

Specific details regarding preparation, issuance, and distribution of the various required reports are given in the following sections of this volume, as well as instructions regarding the keeping of various types of records.

It is the intent that this volume will be updated from time to time as conditions necessitate, such as a reduction or increase in O&M (operation and maintenance) information desired, revision of a printed form, altered distribution of a particular report, etc. Accordingly, individual pages of the initial issue of this volume, and the associated figures, tables, and appendices are all dated. As new or revised pages of the volume or related materials are issued, they will bear new issuance dates. This volume replaces PO&M Bulletin No. 4 dated 6/88 in total.

2. OPERATION AND MAINTENANCE REPORTS

A variety of reports covering various aspects of power O&M activities require preparation, submission, and distribution at regular intervals. Certain other reports concerning events which occur either infrequently or at irregular intervals shall be prepared on an individual event basis. Detailed requirements for these reports are outlined in the following sections of this chapter.

A. Monthly reports

I. Monthly Project Report of Power O&M Activities

A narrative report of power O&M activities shall be prepared and distributed monthly by the power O&M office(s) on each project that includes operating power facilities. The report shall be distributed within the region as specified by the Regional Director. One copy shall be provided the Chief, Facilities Engineering Branch, Denver Office. The copy for the Denver Office shall be forwarded to reach that office by the 20th day of the month.

This report shall describe briefly all important nonroutine events of a power O&M nature which occurred during the month, such as date, time, duration, extent and cause of system disturbances or equipment trouble, including remedial action; major items of maintenance undertaken or accomplished, new service connections; changes in system arrangement or interconnections with adjacent utilities; major power interchanges between systems or water movements scheduled or accomplished; new facilities added; important personnel activities; etc. Two good examples of such reports are included as appendices A and B.

[Appendix A](#) is a report by the single office responsible for both O&M activities on the various units and divisions of a statewide power project.

[Appendix B](#) is a report covering power operation activities only. It is prepared in a systemwide operations office from records in that office and subarea dispatching offices. Other offices are responsible for power maintenance activities on the system, and the submission of reports thereon.

II. Monthly Reports of Power Operations

An operation report shall be prepared and distributed monthly, for each powerplant, every pumping plant with installed capacity of 15,000 horsepower or greater, and each plant engaged in a combination of power generation and pumping, using forms PO&M-59, -59A, or -59B, respectively. If entries for a single month require more than a single page, one or more continuation sheets (form PO&M-59C) shall be used. These reports shall be distributed within the region as specified by the Regional director, who will make distribution with a copy of the Chief, Facilities Engineering Branch, Denver Office, copy for the Denver Office shall be forwarded to reach that office by the 20th day of the month following the reported month.

Certain information on these forms is intended for use in ADP procedures. Quantities to be son treated are those appearing in boxes or columns whose headings are enclosed by heavy borderlines. Associated with each such block or column heading appears one or two numbers. These indicate the range of columns assigned on a standard 80-column ADP data entry format.

(II-a) Instructions for Preparing Form PO&M-59. "Monthly Report of Power Operations - Powerplants"

Figure 1 is an example of a properly completed form PO&M-59. One report is to be prepared for each powerplant covering operations each calendar month. If reporting remote or nonattended powerplant, adjust the hours to report actual full month period starting at midnight (0000) on first of the month and ending as of midnight on the last day of the month (2400). Instructions for reporting under the various headings (see fig. 2), in the sequence in which they appear on the form, are as follows:

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(1)	Powerplant	Official name of powerplant, followed by total Installed generating capacity (in kw) in service at the end of the reported month (including station-service units), and followed by the official name of the project. (Data reported for Trinity Powerplant on the Central Valley Project should include information for the Lewiston Dam power unit.)
(2)	Region	Reclamation geographical region. This is represented by a numerical equivalent: 1 - PN Region 2 - MP Region 3 - LC Region 4 - UC Region 6 - GP Region
(3)	Facility	Insert the appropriate code listed in FIST Volume 4-2 , "Power O&M Codes for ADP," for the particular powerplant being reported.
(4)	Type	This block contains a preprinted letter for ADP use.
(5)	Date	Insert a four-digit abbreviation for the year and month - e.g., 8707 for July 1987, or 8711 for November 1987.
(6)	Card	This block contains a preprinted number for ADP use.
(7)	Gross Generation	KWh output during the month for all generators, including station-service units. The plant unit generation (item 22) must equal the total plant Gross Generation.
(8)	Plant Auxiliary Use	Total energy used during the month for plant operation, whether supplied by main or station-service units, or obtained from the outside system. It includes power used for plant lighting and operation of plant auxiliaries. Power used for synchronous condenser operation of the generating units to improve system voltage and to

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(8)	Plant Auxiliary Use (continued)	supply reactive power for system operation, basically should be charged to the power transmission system, not to production. Accordingly, do not include "plant use" any energy required for operating generating units as synchronous condensers.
(9)	Net Generation	Gross Generation (item 7) less Plant Auxiliary Use (item 8).
(10)	Maximum Hourly Generation	Report the largest total generation (including station-service units) during any "whole" clock hour - e.g., between 1900 and 2000, not 1830 and 1930.
(11)	Condenser Operation	Report total energy input (motoring energy), if any, to generating units while being operated as synchronous condensers.
(12)	Plant Factor	A measure of plant performance during the month from the standpoint of energy production. Ratio (expressed in percent) of the Gross Generation for the month (item 7) divided by the product of the number of hours in the month and the installed capacity. Computation of this quantity is optional. Local awareness may be desirable. A value for this quantity, determined by ADP procedures, will appear on PO&M Report 120.
(13)	Utilization Factor	A measure of plant performance during the month from the standpoint of capacity use. Ratio (expressed in percent) of the Maximum Hourly Generation (Item 10) to installed capacity. Computation of this quantity is optional. Local awareness may be desirable. A value for this quantity, determined by ADP procedures, will appear in PO&M Report 120.
(14)	Water for Generation	Quantity of water, in acre-feet, passed through all turbines in the plant for the month. If water-measuring devices are installed at the plant, these should be used in establishing the amount of water used for power generation during the month; otherwise the quantity should be estimated from turbine gate position on all units except those regulating system frequency or tieline loading. For regulating units, estimates for the variable periods may be prepared on the basis of kilowatt-hours generated. Checks should be made against afterbay stream-gauge flow readings, if practicable.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(15)	Other Water Released Downstream	Quantity of water, in acre-feet, available for the generation of power, but which was bypassed downstream (released or spilled) and not utilized for generation because of lack of system load, insufficient powerplant generating capability to utilize all water, or other reasons. Also include (with appropriate footnote) quantity of water released for any major local auxiliary use, such as operation of fish trap or ladder.
(16)	KWh Generation/AF	Computed as the ratio of Gross Generation (item 7) to Water for Generation (item 14), rounded to closest tenth.
(17)	Elevations and Flow at Month End	The forebay and tailrace water surface elevations, measured to the nearest hundredth of a foot, during the period of maximum plant generation on the last day of the reported month. Also report the total release downstream (in cfs) at the time of maximum plant generation, including other downstream releases (if any) which might have occurred simultaneously.
(18)	Water Factor	A measure of plant performance from the standpoint of water use. Ratio, expressed in percent, of Water for Generation (item 14) to total water released downstream (sum of items 14 and 15). Computation of this quantity is optional. Local awareness may be desirable.
(19)	Card	This block contains a preprinted number for ADP use.
(20)	Unit Service Record	<p>This portion of the report shall be used for itemizing particular operating and maintenance information for each generating unit in the plant.</p> <p>Certain data from this part of the form will be used in ADP applications. Each event or totalization of data for each unit will involve storage of an individual piece of information. Therefore, each event for each unit should be listed on a separate line, grouped first by unit designation, then chronologically by date and hour. If more than one outage occurred for a particular unit during the reported period, list first the <u>totals</u> for that unit, followed chronologically by individual entries on separate lines for each maintenance shutdown, whether scheduled or forced.</p>
(21)	Unit No.	Insert the designated unit number, such as N7, 2, LS1.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(22)	Gross Generation	<p>Report the gross generation of each unit in the plant, including station-service units. Where watt-hour meters with ratchets are provided, this quantity would be the difference between "OUT" meter readings at the end and beginning of the month. For meters without ratchets, the summation of reverse rotation (if any) for synchronous condenser operation should be determined and added to the indicated forward rotation of the meter.</p> <p>The sum of power generation by all units must equal the total plant Gross Generation (item 7).</p>
(23)	Time Operated	<p>Generally the difference of the unit time-meter readings at the end and beginning of the reporting month where such meters are provided; otherwise, the reported figure should be the summation of the operating periods during which the unit was rotating during the month, from the time of starting to the time of shutdown as recorded on the plant log, regardless of whether the unit was running for test purposes, delivering power to the bus, motoring as a synchronous condenser, or providing system spinning reserve. Record in decimal hours, rounded to closest tenth - e.g., 412.3.</p>
(24)	Time Available	<p>The period during which a unit is in service or ready for service. This period must equal the total hours in the month minus all periods during which the unit was <u>not</u> available for operation. Record in hours and minutes - e.g., 483:06.</p>
(25)	Availability Factor	<p>Computed ratio of Time Available (item 24) to total hours in month, expressed in percent, and rounded to closest tenth of 1 percent.</p>
(26)	Unit Starts	<p>Report the number of times the unit was started during the month.</p>
(27)	Maintenance Information	<p>Entries in all columns under this general heading on the form shall relate to unit outages or shutdowns <u>strictly</u> for maintenance reasons.</p> <p>If no outages for maintenance occurred during the month for a unit, entries of zero should be made on the same line as the unit number in the four columns headed "Duration," "Individual Outage," "Total for Month," and "Maintenance Factor" (items 31, 33, 34, and 35, respectively). (See entries for Unit 3 on</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(27)	Maintenance Information (Continued)	<p>Sample form PO&M-59, fig 1.)</p> <p>If only one outage for maintenance occurred during the month for a unit, all entries should be made on the same line as the unit number. (See entries for Unit 1 on sample form PO&M-59, fig 1.)</p> <p>If two or more outages for maintenance occurred during the month for a unit, entries for "Total for Month" and "Maintenance Factor" should be made on the same line as the unit number. Entries for each individual outage should be made on successively following lines in chronological order. (See entries for Unit 2 on sample form PO&M-59, fig 1.)</p>
(28)	Type	Indicate by "F" or "S" whether the outage was "forced or "scheduled."
(29)	Day	For each individual outage, insert a <u>two-digit</u> figure in chronological order to indicate the day of the month on which the outage occurred - e.g., 03 for the 3 ^d Day, or 27 for the 27 th day.
(30)	Time	<p>Insert a <u>four-digit</u> figure to indicate, to the closest minute, the timed of day at which the outage occurred, measured on a 24-hour time basis - e.g., 0042 represents 12:42 a.m., or 1733 represents 5:33 p.m.</p> <p>For a prolonged outage extending from the preceding month, insert <u>four zeros</u> in this column, and "01" in the "day" column. (See entries for Unit 8 on sample form PO&M-59, fig 1.)</p>
(31)	Duration	<p>For each maintenance outage, indicate the total elapsed time in hours and minutes that the unit was out of service, measured from the time the outage began until the unit either was returned to service or was available for operation, whichever applied. This will include all nonwork times such as meal, night, and weekend periods.</p> <p>Maintenance of power system facilities "outside the plant" (low-voltage side of the step-up transformer and beyond) which makes a generating unit unavailable for operation, should be reported in this column, and should be described by appropriate notation in the column titles "Description of Maintenance or Forced Outage." (See entries for Unit 2 for the 26th of the month at 0840 hours on sample form PO&M-59, fig 1.)</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(32)	Actual Maintenance Time	Entries in the columns under this general heading on the form shall relate to time that maintenance work was <u>actually</u> being performed on the unit.
(33)	Individual Outage	For each outage, report the time in hours and minutes that work <u>actually</u> was performed on the generating unit or essential auxiliaries. Do not include nonwork time such as meal, night, or weekend periods.
(34)	Total for Month	On the same line as the unit number, enter the total time for the month, in hours and minutes, that maintenance work was actually being performed on the unit; This quantity should equal the sum of entries in the preceding column for all maintenance outages of the unit during the month.
(35)	Maintenance Factor	<p>A measure of maintenance performance on each generating unit. The factor is the ratio of the Total <u>Actual</u> Maintenance Time for the unit during the month (item 34) to the total hours in the month.</p> <p>Express in percent, and round to closest tenth of 1 percent.</p>
(36)	GADS Cause Code	GADS (Generating Availability Data System) cause codes as published by NERC (North American Electric Reliability Council) (see section VI, FIST Manual 4-2 , "Power O&M Codes for ADP").
(37)	Description of Maintenance or Forced Outage	Provide a brief description of maintenance performed, and the cause or reason for each forced outage.

MONTHLY REPORT OF POWER OPERATIONS - POWERPLANTS

POWERPLANT
GLEN CANYON

INSTALLED CAPACITY (kw)
1,288,000

PROJECT
Colorado River Storage

CARD	GROSS GENERATION (kwh)	PLANT AUXILIARY USE (kwh)	NET GENERATION (kwh)	HOURLY GENERATION (kwh)	CONDENSER OPERATION (kwh)	PLANT FACTOR (%)	UTILIZATION FACTOR (%)
10-11	12	14-23	24-31	32-41	42-49	50-59	60-69
11	4	412,075,000	950,659	411,124,561	1,093,000	43	84
WATER FOR GENERATION (A.F.)		OTHER WATER RE-LEASED DOWNSTREAM (A.F.)	kwh GENERATION/A.F.		ELEVATIONS AND FLOW AT MONTH END		
					FOREBAY (FT.)		
					TAILRACE (FT.)		
					TOTAL FLOW (C.F.S.)		
843,050		0	488.8		5158.63		
14,514					100		

UNIT SERVICE RECORD

UNIT SERVICE RECORD														
UNIT NO.	GROSS GENERATION (kwh)	TIME OPERATED (hrs)	TIME AVAILABLE (hrs:min)	AVAILABILITY FACTOR (%)	PLANT FACTOR (%)	MAINTENANCE INFORMATION								
						OUTAGES FOR MAINTENANCE			ACTUAL MAINTENANCE TIME			GADS CAUSE CODE	DESCRIPTION OF MAINTENANCE OR FORCED OUTAGE	
						TYPE	DATE	TIME	DURATION (hrs:min)	INDIVIDUAL OUTAGE (hrs:min)	TOTAL FOR MONTH (hrs:min)			MAINTENANCE FACTOR (%)
4-19	52-41	20-29	24-28			20-30-31	32-35	36-40	41-45	46-50	51-55	62-64		
1	9,570,000	55.0	73:13	9.8	2	S	04	0113	670:47	198:10	198.10	26.6	Annual maintenance and repair seal ring	
2	72,135,000	370.7	536:30	72.1	12	S	06	0837	99:05	34:25	54:20	7.3	XIA S.O.P. change diff. relaying	
3	50,255,000	415.2	744:00	100.0	19	S	26	0840	0:35			0	Repair transformer oil cooler	
4	74,270,000	677.5	744:00	100.0	11	F	27	1210	107:50	19:55		0	Thrust bearing running hot	
5	74,240,000	636.7	744:00	100.0	12				0	0	0	0		
6	75,860,000	655.9	740:14	99.5	8	S	20	1143	3:46	2:32	2:32	3.5	Upper guide brg. oil res. chg.	
7	55,745,000	549.0	744:00	100.0	9				0			0		
8	0	0	0	100.0	14	S	01	0000	744:00	128:00	128.00	17.2	Rewind	

DEFINITIONS:
AVAILABILITY FACTOR = $\frac{\text{TIME AVAILABLE} \times 100}{\text{HOURS IN MONTH}}$

REFER TO FIST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING

MAINTENANCE FACTOR = $\frac{\text{ACTUAL MAINTENANCE TIME} \times 100}{\text{HOURS IN MONTH}}$

*Refer to North American Electric Reliability Council Publ. (Generating Availability Data System)

MONTHLY REPORT OF POWER OPERATIONS - POWERPLANTS

POWERPLANT										PROJECT		DATE				
INSTALLED CAPACITY (kw)										FACILITY		YR. MO. DAY				
										1 2-4 5		6-9				
(1)										(2) (3)		(4) (5)				
CARD	GROSS GENERATION (kwh)	PLANT AUXILIARY USE (kwh)	NET GENERATION (kwh)	HOURLY GENERATION (kwh)	CONDENSER OPERATION (kwh)	PLANT FACTOR (%)	UTILIZATION FACTOR (%)									
10-11	12-23	24-31	32-41	42-49												
11(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)									
WATER FOR GENERATION (A.F.)		OTHER WATER RE-LEASED DOWNSTREAM (A.F.)		ELEVATIONS AND FLOW AT MONTH END		WATER FACTOR (%)										
				FOREBAY (FT.) TAILRACE (FT.) TOTAL FLOW (C.F.S.)												
(14)		(15)		(16)		(17)		(18)								
UNIT SERVICE RECORD																
CARD	(20)															
10-11	(21) (19)															
UNIT NO.	GROSS GENERATION (kwh)	TIME OPERATED (hrs)	TIME AVAILABLE (hrs/min)	AVAILABILITY FACTOR (%)	OUTAGES FOR MAINTENANCE	ACTUAL MAINTENANCE TIME	MAINTENANCE FACTOR (%)	GADS CAUSE CODE	DESCRIPTION OF MAINTENANCE OR FORCED OUTAGE							
1-19	20-23	24-28	29-31	32-35	36-40	41-45	46-50	51-55								
(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)

DEFINITIONS:
 AVAILABILITY FACTOR = $\frac{\text{TIME AVAILABLE X 100}}{\text{HOURS IN MONTH}}$
 MAINTENANCE FACTOR = $\frac{\text{ACTUAL MAINTENANCE TIME X 100}}{\text{HOURS IN MONTH}}$
 * Refer to: North American Electric Reliability Council Publ. (Generating Availability Data System)
 REFER TO FIRST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING

(II-b) Instructions for Preparing Form PO&M-59A. "Monthly Report of Power Operations - Pumping Plants"

Figure 3 is an example of a properly completed Form PO&M-59A. One report shall be prepared for each pumping plant with a total installed pump-motor capacity of 15,000 horsepower or greater, covering operations each calendar month. Instructions for reporting under the various headings (see fig. 4) in the sequence in which they appear on the form, are as follows:

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(1)	Pumping Plant	Official name of pumping plant, followed by total Installed pump-motor capacity (in horsepower) in service at the end of the reported month, followed by the official name of the project.
(2)	Region	Reclamation geographical region. This is represented by a numerical equivalent: 1 - PN Region 2 - MP Region 3 - LC Region 4 - UC Region 6 - GP Region
(3)	Facility	Insert the appropriate code listed in FIST Volume 4-2 "Power O&M Codes for ADP," for the particular pumping plant being reported.
(4)	Type	This block contains a preprinted letter for ADP use.
(5)	Date	Insert a four-digit abbreviation for the year and month - e.g., 8706 for June 1987, or 8711 for November 1987.
(6)	Card	This block contains a preprinted number for ADP use.
(7)	Pumping Energy Used	Report the total energy used during the month by all units for pumping water. Also see item 17 regarding identification of energy used, If any, for operation of units as synchronous condensers.
(8)	Plant Auxiliary Use	That part of total energy input to the plant used during the month for operation of the plant. It includes power used for lighting, heat, and operation of plant auxiliaries.
(9)	Maximum Demand	Greatest power demand, in kw, occurring during the monthly reporting period.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(10)	Water Pumped	Quantity of water, in acre-feet, pumped by all the pumping units of the plant during the month. If water-measuring devices are installed at the plant, these should be used in establishing the amount of water pumped during the month; otherwise the quantity should be estimated from the head-discharge performance curves of the pumps as based on manufacturer's and plant test data. Estimates may be made against kilowatt-hours of pumping energy used when the head-energy-discharge relationship has been established. Checks should be made against discharge-channel stream-gauge flow readings or discharge-conduit flowmeter readings, if practicable.
(11)	KWh Pumping/AF	Ratio of the Pumping Energy Used for the month (item 7) to the quantity of Water Pumped (item 10), rounded to the closest tenth.
(12)	Average Pumping Head	The average pumping head to be reported each month is the difference in feet between the <u>average</u> discharge elevation and the <u>average</u> intake elevation.
(13)	Intake and Discharge Elevations at Month End	The water surface elevations of the intake bay or channel and of the discharge bay or channel, measured to the nearest hundredth of a foot at the time of maximum demand on the pumping plant during the last day of the reported month.
(14)	Card	This block contains a preprinted number for ADP use.
(15)	Unit Service Record	This portion of the report shall be used for itemizing particular operating and maintenance information for each pumping unit in the plant. Certain data from this part of the form will be used in ADP applications. Each event or totalization of data for each unit will involve storage of an individual piece of information. Therefore, list each event or totalization of data for each unit on a separate line, grouped first by unit designation, then chronologically by date and hour. If more than one outage occurred for a particular unit during the reported period, list first the <u>totals</u> for that unit, followed chronologically by individual entries on separate lines for each maintenance shutdown, whether scheduled or forced.
(16)	Unit Number	Insert the designated unit number, such as 1, P-5, etc.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(17)	Pumping Energy Used	<p>Report the total energy used during the month by each unit for pumping. This quantity would be the difference between watt-hour meter readings for each unit at the end and beginning of the reported month. The sum of the quantities in this column must equal the total plant Pumping Energy Used (item 7).</p> <p>An exception would occur whenever a unit was operated unloaded as a synchronous condenser. In that event, the energy used for condenser operation should be deducted, totaled for all units, and indicated in a footnote at the bottom of the report. (See sample form PO&M-59A, fig. 3.)</p>
(18)	Time Operated	<p>Generally the difference of the unit time-meter readings at the end and beginning of the reporting month where such meters are provided. Where no meters are provided, the reported figure should be the summation of the operating periods during which the unit was rotating during the month, from the time of starting to the time of shutdown as recorded on the plant log, regardless of whether the unit was running for test purposes, actually pumping, or operating unloaded as a synchronous condenser to provide reactive-power and/or voltage support to the power system. Record in decimal hours, rounded to closest tenth - e.g., 716.4.</p>
(19)	Time Available	<p>The period during which a unit is in service or ready for service. This period must equal the total hours in the month minus all periods during which the unit was <u>not available</u> for operation. Record in hours and minutes - e.g., 716:54.</p>
(20)	Availability Factor	<p>Computed ratio of Time Available (item 19) to total hours in month, expressed in percent, and rounded to the closest tenth of 1 percent.</p>
(21)	Unit Starts	<p>Report the number of times the unit was started during the month.</p>
(22)	Maintenance Information	<p>Entries in all columns under this general heading on the form shall relate to unit outages or shutdowns <u>strictly</u> for maintenance reasons.</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(22)	Maintenance Information (continued)	<p>If no outages for maintenance occurred during the month for a unit, entries of zero should be made on the same line as the unit number in the four columns headed "Duration," "Individual Outage," "Total for Month," and "Maintenance Factor" (items 26, 28, 29, and 30, respectively). (See entries for Unit 1 on sample form PO&M-59A, fig. 3.)</p> <p>If only one outage for maintenance occurred during the month for a unit, all entries should be made on the same line as the unit number. (See entries for Unit 2 on sample form PO&M-59, fig. 3.)</p> <p>If two or more outages for maintenance occurred during the month for a unit, entries for "Total for Month" and "Maintenance Factor" should be made on the same line as the unit number. Entries for each individual outage should be made on successively following lines in chronological order. (See entries for Unit 3 on sample form PO&M-59A, fig. 3.)</p>
(23)	Type	Indicate by "F" for "S" whether the outage was "forced" or "scheduled."
(24)	Day	For each individual outage, insert a <u>two-digit</u> figure to indicate the day of the month on which the outage occurred -e.g., 03 for the third day, or 27 for the 27th day.
(25)	Time	<p>Insert a <u>four-digit</u> figure to indicate, to the closest minute, the time of day at which the outage occurred, measured on a 24-hour time basis - e.g., 0042 represents 12:42 a.m., or 1733 represents 5:33 p.m.</p> <p>For a prolonged outage extending from the preceding month, insert four zeros in this column, and "01" in the "day" column. (See entries for Unit 7 on sample form PO&M-59, fig. 3.)</p>
(26)	Duration	For each maintenance outage, indicate the total elapsed time in hours and minutes that the unit was out of service, measured from the time the outage began until the unit either was returned to service or was available for operation, whichever applied. This will include all nonwork times such as meal, night, and weekend periods.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(26)	Duration (continued)	Maintenance of power system facilities "outside the plant" (low-voltage side of the step-up transformer and beyond) which makes a pumping unit unavailable for operation, should be reported in this column, and be described by appropriate notation in the column titled "Description of Maintenance or Forced Outage." (See entries for Unit 3 for the 23th of the month on sample form PO&M-59A, fig. 3.)
(27)	Actual Maintenance Time	Entries in the columns under this general heading on the form shall relate to time that maintenance work was <u>actually</u> being performed on the unit.
(28)	Individual Outage	For each outage, report the time in hours and minutes that work <u>actually</u> was performed on the pumping unit or essential auxiliaries. Do <u>not</u> include nonwork time such as meal, night, or weekend periods.
(29)	Total for Month	On the same line as the unit number, enter the total time for the month, in hours and minutes, that maintenance work was <u>actually</u> being performed on the unit. This quantity must equal the sum of entries in the preceding column for all maintenance outages of the unit during the month.
(30)	Maintenance Factor	A measure of maintenance performance on each pumping unit. The factor is the ratio of the Total <u>Actual</u> Maintenance Time for the unit during the month (item 29) to the total hours in the month. Express in percent, and round to closest hundredth of 1 percent.
(31)	Description of Maintenance or Forced Outage	Provide a brief description of maintenance performed, and the cause or reason for each forced outage.

MONTHLY REPORT OF POWER OPERATIONS - PUMPING PLANTS

PUMPING PLANT		CLERMONT VALLEY		INSTALLED CAPACITY (hp)		135,000 hp		PROJECT		Kewmans			
CARD		PUMPING ENERGY USED (kwh)	14-23	PLANT AUXILIARY USE (kwh)	1,473,000	MAXIMUM DEMAND (kw)	42.43	WATER PUMPED (A.F.)	231,724	kwh PUMPING/A.P.	210.2	AVERAGE PUMPING HEAD (FT.)	192.1
10-11	12											ELEVATIONS AT MONTH END	
												INTAKE (FT.)	25.05
												DISCHARGE (FT.)	220.40
CARD													
10-11	12												
22													

UNIT SERVICE RECORD

UNIT NO.	GROSS GENERATION (kwh)	TIME OPERATED (hrs)	TIME AVAILABLE (hrs:min)	AVAILABILITY FACTOR (%)	SLEW LINE	MAINTENANCE INFORMATION							DESCRIPTION OF MAINTENANCE OR FORCED OUTAGE
						OUTAGES FOR MAINTENANCE			ACTUAL MAINTENANCE				
						TYPE	DATE	TIME	DURATION (hrs:min)	INDIVIDUAL OUTAGE (hrs:min)	TOTAL FOR MONTH (hrs:min)	MAINTENANCE FACTOR (%)	
14-19	52-61	20-23	24-28			29-31	32-35	36-40	41-45	46-50			
1	10,880,500	716.4	720:00	100.0	2			0	0	0		Change bearing oil.	
2	10,411,100	716.4	716:54	99.6	1	8:13	0800	3:06	3:06	3:06	0.43	Change bearing oil.	
3	10,305,100	708.2	713:43	99.7	3	5:12	0800	3:21	3:21	3:21	0.47	Replace lightning arrester on high-voltage side of transformer.	
4	5,986,800	393.7	715:28	99.4	23	F 04	0832	1:56	1:36	4:32	0.65	Gland maintenance.	
						S 04	1430	2:56	2:56			Change bearing oil.	
5	4,367,400	287.8	692:50	96.7	20	S 11	0800	27:10	10:50	10:50	1.50	Change bearing oil and repair oil leak.	
6	8,849,800	582.2	716:42	99.5	3	S 12	1230	3:18	3:18	3:18	0.46	Change bearing oil.	
7	0	0	0	0	0	S 01	0000	720:00	160:00	160:00	22.22	Undergoing major overhaul.	
												a/ Does not include 25,900 kWh used for condenser operation.	

DEFINITIONS:
AVAILABILITY FACTOR = $\frac{\text{TIME AVAILABLE} \times 100}{\text{HOURS IN MONTH}}$

MAINTENANCE FACTOR = $\frac{\text{ACTUAL MAINTENANCE TIME} \times 100}{\text{HOURS IN MONTH}}$

REFER TO FIRST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING

*Refer to North American Electric Reliability Council Publ. (Generating Availability Data System)

FORM-59A (12-89)

Bureau of Reclamation

MONTHLY REPORT OF POWER OPERATIONS - PUMPING PLANTS

PUMPING PLANT

REG. NO.

FACILITY

TYPE

DATE

1

2-4

5

6-9

(2)

(3)

(4)

(5)

PROJECT

INSTALLED CAPACITY (hp)

CARD

10-13

12

PUMPING ENERGY USED (kwh)

14-23

12-23

PLANT AUXILIARY USE (kwh)

24-33

24-23

MAXIMUM DEMAND (kw)

34-43

34-23

WATER PUMPED (A.F.)

44-53

44-23

kwh PUMPING/A.F.

54-63

54-23

AVERAGE PUMPING HEAD (FT.)

64-73

64-23

ELEVATIONS AT MONTH END

74-83

74-23

12 (6)

A

(7)

(8)

(9)

(10)

(11)

(12)

(13)

UNIT SERVICE RECORD

CARD

10-11

22 (14)

UNIT NO.

14-19

16-19

GROSS GENERATION (kwh)

20-25

20-25

TIME OPERATED (hrs)

26-31

26-28

TIME AVAILABLE (hrs:min)

32-37

32-28

AVAILABILITY FACTOR (%)

38-43

38-28

OUTAGES FOR MAINTENANCE

44-53

44-28

TIME

DURATION (hrs:min)

INDIVIDUAL OUTAGE (hrs:min)

TOTAL FOR MONTH (hrs:min)

MAINTENANCE FACTOR (%)

34-39

40-45

46-51

52-57

58-63

DESCRIPTION OF MAINTENANCE OR FORCED OUTAGE

64-73

64-28

16

(17)

(18)

(19)

(20)

(21)

(22)

(23)

(24)

(25)

(26)

(27)

(28)

(29)

(30)

(31)

DEFINITIONS:

AVAILABILITY FACTOR =

TIME AVAILABLE X 100

HOURS IN MONTH

MAINTENANCE FACTOR =

ACTUAL MAINTENANCE TIME X 100

HOURS IN MONTH

REFER TO FIST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING

*Refer to: North American Electric Reliability Council Publ. (Generating Availability Data System)

Figure 4

(II-c) Instructions for Preparing Form PO&M-59B. "Monthly Report of Power Operations - Pumping-Generating Plants"

Figure 5 is an example of a properly completed form PO&M-59B. One report using this form shall be prepared each calendar month for each plant where the combination activities of generating electric power and pumping major quantities of water through the use of electric power can take place. This includes Installations such as San Luis and Grand Coulee Pumping-Generating Plants, the O'Neill Pumping Plant (since generation may occur occasionally at this installation), and the third unit in the Flatiron Power and Pumping Plant. For San Luis and O'Neill Plants, where responsibilities for certain functions are shared between the United States and the State of California, two copies of this report shall be prepared for each plant: one presenting total operating information for the plant, including the unit service record portion; and the second indicating only the United States' share of generation (gross and net), pumping, water amounts, etc. Instructions for reporting under the various headings in the sequence in which they appear on the form, are as follows:

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(1)	Pumping-Generating Plant	Official name of the plant, followed by the dual rating of total installed pump-motor capacity (in horsepower) and generating capacity (in kW) In service at the end of the month being reported, followed by the official name of the project.
(2)	Region	Reclamation geographical region. This is represented by a numerical equivalent: 1 - PN Region 2 - MP Region 3 - LC Region 4 - UC Region 6 - GP Region
(3)	Facility	Insert the appropriate code listed in FIST Volume 4-2 , "Power O&M Codes for ADP," for the particular pumping-generating plant being reported.
(4)	Type	This block contains a preprinted letter for ADP use.
(5)	Date	Insert a four-digit abbreviation for the year and month - e.g., 8702 for February 1987, or 8711 for November 1987.
(6)	Card	This block contains a preprinted number for ADP use.
(7)	Gross Generation	Output in kWh for all units during the month while operating as generating units.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(8)	Plant Auxiliary Use	Report total energy use for the month for plant operation, whether supplied by the units while generating, or obtained from the outside system while the units were pumping or shut down.
(9)	Net Generation	Energy delivered to the outside system during periods of generation. (On reports for San Luis and O'Neill Plants covering only the United States' portion of plant information, this item should be <u>only</u> the Reclamation portion of delivery to the PGE system.)
(10)	Maximum Hourly	Greatest output in kWh of all units in the plant during any "whole" clock hour - e.g., between 1400 and 1500, not 1430 and 1530.
(11)	Water for Generation	Quantity of water, in acre-feet, utilized during the month for energy generation at the plant. Water-measuring devices should be used in establishing the amount of water used for power generation, if available; otherwise provide best estimate by use of performance curves or other acceptable methods.
(12)	KWh Generation/AF	Computed as the ratio of Gross Generation (item 7) to Water for Generation (item 11), rounded to closest tenth.
(13)	Card	This block contains a preprinted number for ADP use.
(14)	Pumping Energy Used	Report the total energy used during the month by all units for actual pumping of water. Also see item 22 regarding identification of energy used, if any, for operation of units as synchronous condensers.
(15)	Maximum Pumping Demand	Greatest power demand in kW occurring during pumping operations for the monthly reporting period.
(16)	Water Pumped	Quantity of water, in acre-feet, pumped by all units during the month. Water-measuring devices should be used in establishing the amount of water pumped during the month, if available.
(17)	KWh Pumping/AF	Computed as the ratio of Pumping Energy Used (item 14) to Water Pumped (item 16), rounded to closest tenth.
(18)	Upper and Lower Pond Elevations at Month End	The water surface elevations of these ponds, measured to the nearest hundredth of a foot, at the time of maximum generated kilowatt output during the last day of the reporting month. If plant was not used for generating energy during the last day

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(18)	Upper and Lower Pond Elevations at Month End (continued)	of the month, report elevations at time of maximum pumping demand.
(19)	Card	This block contains a preprinted number for ADP use.
(20)	Unit Service Record	This portion of the report shall be used for itemizing particular operating and maintenance information for each unit in the plant. Certain data from this part of the form will be used in ADP applications. Each event or totalization of data for each unit will involve storage of an individual piece of information. Therefore, list each event or totalization of data for each unit on a separate line, grouped first by unit designation, then chronologically by date and hour. If more than one outage occurred for a particular unit during the reported period, list first the <u>totals</u> for that unit, followed chronologically by individual entries on separate lines for each maintenance shutdown, whether scheduled or forced.
(21)	Unit No.	Insert the designated unit number, such as 3, P/G-7, etc.
(22)	Power Generated or Pumping Energy Used	<p>Report the gross generation of each unit in the plant during the month while operating as a generating unit, preceded by the letter "G." Where watt-hour meters with ratchets are provided, this quantity for each unit would be the difference between "OUT" meter readings at the end and beginning of the month. For meters without ratchets, it will be necessary to determine this quantity from meter readings at the beginning and end of each period of generator operation during the month. If no generation occurred for a unit, indicate "G - O." The sum of the quantities designated "G" in this column must equal the total plant Gross Generation (item 7).</p> <p>On a second line for each unit, report the energy used while operating as a pumping unit, preceded by the letter "P." Where watt-hour meters with ratchets are provided, this quantity for each unit would be the difference between "IN" meter readings at the end and beginning of the month. For meters without ratchets, it will be necessary to determine this quantity from meter readings at the beginning and end of each period of pumping. If no pumping occurred for a unit, indicate "P - O." The sum of the quantities designated "P" in this column must equal the total plant Pumping Energy used (item 14).</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(22)	Power Generated or Pumping Energy Used (continued)	An exception could occur if a unit was operated unloaded as a synchronous condenser. In that event, the energy used for condenser operation should be deducted, totaled for all units, and indicated in a footnote at the bottom of the report. (See sample form PO&M-59B, fig. 5.)
(23)	Time Operated	Generally the difference of the unit time-meter readings at the end and beginning of the reporting month where such meters are provided; otherwise, the reported figure should be the summation of the operating periods during which the unit was rotating during the month, from the time of starting to the time of shutdown as recorded on the plant log, regardless of whether the unit was running for test purposes, delivering power to the bus, or motoring as a synchronous condenser. Record in decimal hours, rounded to closest tenth - e.g., 508.6, on the same line that contains generation data for the unit.
(24)	Time Available	The period during which a unit is in service or ready for service. This period must equal the total hours in the month minus all periods during which the unit was <u>not</u> available for operation. Record in hours and minutes - e.g., 662:15, on the same line that contains generation data for the unit.
(25)	Availability Factor	Computed ratio of Time Available (item 24) to total hours in month, expressed in percent, and rounded to closest tenth of 1 percent. Record on same line that contains generation data for the unit.
(26)	Unit Starts	Report the number of times the unit was started during the month. Record on same line that contains generation data for the unit.
(27)	Maintenance Information	<p>Entries in all columns under this general heading on the form shall relate to unit outages or shutdowns <u>strictly</u> for maintenance reasons.</p> <p>If only one outage for maintenance occurred during the month for a unit, all entries should be made on the same line as the unit number. (See entries for Unit P/G-2 on sample form PO&M-59B, fig. 5.)</p> <p>If no outages for maintenance occurred during the month for a unit, entries of <u>zero</u> should be made on the same line as the unit number in the four columns headed "Duration," "Individual Outage," "Total for Month," and "Maintenance Factor" (items 31, 33, 34, and 35, respectively). (See</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(27)	Maintenance Information (continued)	<p>entries for Unit P/G-1 on sample form PO&M-59B, fig. 5.)</p> <p>If two or more outages for maintenance occurred during the month for a unit, entries for "Total for Month" and "Maintenance Factor" should be made on the same line as the unit number. Entries for each individual outage should be made on successively following lines in chronological order. (See entries for Unit P/G-3 on sample form PO&M-59B, fig. 5.)</p>
(28)	Type	Indicate by "F" or "S" whether the outage was "forced" or "scheduled."
(29)	Day	For each individual outage, insert a <u>two-digit</u> figure to indicate the day of the month on which the outage occurred - e.g., 03 for the third day, or 27 for the 27th day.
(30)	Time	<p>Insert a <u>four-digit</u> figure to indicate, to the closest minute, the time of day at which the outage occurred, measured on a 24-hour time basis - e.g., 0042 represents 12:42 a.m., or 1733 represents 5:33 p.m.</p> <p>For a prolonged outage extending from the preceding month, insert <u>four zeros</u> in this column, and "01" in the "Day" column. (See entries for Unit P/G-2 on sample form PO&M-59B, fig. 5.)</p>
(31)	Duration	<p>For each outage, indicate the total elapsed time in hours and minutes that the unit was out of service, measured from the time the outage began until the unit either was returned to service or was available for operation, whichever applied. This will include all nonwork times such as meal, night, and weekend periods.</p> <p>Maintenance of power system facilities', "outside the plant" (low-voltage side of the main transformer and beyond) which makes a unit unavailable for either pumping or generating, should be reported in this column, and should be described by appropriate notation in the column titled "Description of Maintenance or Forced Outage." (See entries for Unit P/G-3 for the 10th of the month at 0800 hours on sample form PO&M-59B, fig. 5.)</p>
(32)	Actual Maintenance Time	Entries in the columns under this general heading on the form shall relate to time that maintenance work was <u>actually</u> being performed on the unit.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(33)	Individual Outage	For each outage, report the time in hours and minutes that work <u>actually</u> was performed on the pumping-generating unit or essential auxiliaries. <u>Do</u> not include nonwork time such as meal, night, or weekend periods.
(34)	Total for Month	On the same line as the unit number, enter the <u>total</u> time for the month, in hours and minutes, that maintenance work was <u>Actually</u> being performed on the unit. This quantity should equal the sum of entries in the preceding column for all maintenance outages of the unit during the month.
(35)	Maintenance Factor	A measure of maintenance performance on each pumping-generating unit. The factor is the ratio of the Total <u>Actual</u> Maintenance Time for the unit during the month (item 34) to the total hours in the month. Express in percent, and round to closest tenth of 1 percent.
(36)	GADS Cause Code	GADS (Generating Availability Data System) cause code as published by NERC (North American Electric Reliability Council) (see section VI, Fist Volume 4-2 , "Power O&M Codes for ADP").
(37)	Description of Maintenance or Forced Outage	Provide a brief description of maintenance performed, and the cause or reason for each forced outage.

MONTHLY REPORT OF POWER OPERATIONS - PUMPING-GENERATING PLANTS

PUMPING-GENERATING PLANT		PROJECT		FACILITY		DATE	
Custer Butte		NCOMBANS		1		8702	
INSTALLED CAPACITY (hp-kw)		WATER FOR GENERATION (A.F.)		TYPE		YR. MO.	
143,000 hp --- 100,000 kW		15,420		5		6-9	
CARD	GROSS GENERATION (kwh)	PLANT AUXILIARY USE (kwh)	NET GENERATION (kwh)	HOURLY GENERATION (kwh)	MAXIMUM GENERATION (kwh)	WATER FOR GENERATION (A.F.)	
10-11	1423	24-31	32-41	42-49	42-49	kwh GENERATION/A.F.	
11	13,005,100	87,840	12,917,260	102,500	102,500	843.4	
CARD	PUMPING ENERGY USED (kwh)	MAX. PUMPING DEMAND (kw)	WATER PUMPED (A.F.)	kwh PUMPING/A.F.	ELEVATIONS AT MONTH END		
10-11	14-23	42-49			UPPER POND (FT.)		
12	18,697,100	93,600	15,430	1211.7	1,988.75		
					1,007.50		

UNIT SERVICE RECORD

UNIT NO.	GROSS GENERATION OR PUMPING ENERGY USED (kwh)	TIME OPERATED (hrs)	TIME AVAILABLE (hrs:min)	AVAILABILITY FACTOR (%)	START TIME	MAINTENANCE INFORMATION										DESCRIPTION OF MAINTENANCE OR FORCED OUTAGE
						OUTAGES FOR MAINTENANCE			ACTUAL MAINTENANCE			GADS CAUSE CODE				
						TYPE	TIME	DURATION (hrs:min)	INDIVIDUAL OUTAGE (hrs:min)	TOTAL FOR MONTH (hrs:min)	MAINTENANCE FACTOR (%)					
14-19	51	52	61	20-23	24-28	29-30	31-35	36-40	41-45	46-50	62-64					
P/G-1	G 6,501,300 P 9,346,500	506.3	672:00	100.0	53			0	0	0	0		Unit undergoing major overhaul			
P/G-2	G 0 P 0	0	0	0	0	S 01	0000	672:00	152:00	52:00	22.62					
P/G-3	G 6,503,800	508.6	662:15	98.5	56	S 10	0800	3:58		5:17	0.79			Replace transformer oil pump. Replace and adjust one slip-ring brush. Replace packing in turbine head-cover stuffing box.		
	P 9,350,600					F 10	1710	5:14	2:44							
						S 28	0915	2:53	2:53				a/ Does not include 52,700 kWh used for condenser operation.			

DEFINITIONS:
 AVAILABILITY FACTOR = $\frac{\text{TIME AVAILABLE} \times 100}{\text{HOURS IN MONTH}}$
 MAINTENANCE FACTOR = $\frac{\text{ACTUAL MAINTENANCE TIME} \times 100}{\text{HOURS IN MONTH}}$
 REFER TO FIRST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING
 *Refer to North American Electric Reliability Council Publ. (Generating Availability Data System)

(II-d) Instructions for Preparing Form PO&M-59C. "Monthly Report of Power Operations - Continuation Sheet"

Figure 7 is a sample of form PO&M-59C. In the event the unit service record part of the report for an individual powerplant, pumping plant, or pumping-generating plant cannot be completed on a single sheet of form PO&M-59, -59A, or -59B, respectively, one or more continuation sheets (form PO&M-59C) shall be used. Instructions for reporting under the various headings, in the sequence in which they appear on the forms, are as follows:

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(1)	PO&M-59	Leave this space blank If sheet is being used for continuation of a powerplant report; add "A" or "B" if being used for continuation of a pumping plant or a pumping-generating plant report, respectively.
(2)	Plant	Official name of the specific facility (powerplant, pumping plant, or pumping-generating plant) for which the continuation sheet is being used.
(3)	Region	Insert the same code appearing on sheet 1 of the report.
(4)	Facility	Insert the same code appearing on sheet 1 of the report.
(5)	Type	Insert the same letter as used on sheet 1 of the report.
(6)	Date	Insert the same date as used on sheet 1 of the report.
(7)	Card	Insert in this block the <u>same</u> number (21, 22, or 23) preprinted at this specific location on sheet 1 of the report.
(8)	Unit Service Record	Continue entries using same instructions for forms PO&M-59, -59A, or -59B, whichever are applicable.

POBNA-59C (5-89)
Bureau of Reclamation

SHEET _____ OF _____ (1) _____
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PLANT						DATE				
REG	FACILITY	TYPE	NR	BAG		MR	DAY			
1	2-4	5				8-9				
(3)	(4)	(5)	(6)							
UNIT SERVICE RECORD										
CAPD 10-11										
(7)										
UNIT NUMBER (8)	GROSS GENERATION OR PUMPING ENERGY (USFT)	TIME OPERATED AVAILABLE (hrs) / 1000 G	TIME AVAILABLE (hrs/min) / 1000 G	AVAILABLE FACTOR (%)	UNIT STARTS	MAINTENANCE INFORMATION				
						DURABLES FOR MAINTENANCE		ACTUAL MAINTENANCE TIME		
DAY	TIME	DURATION (hrs/min)	INDIVIDUAL OUTPUT (lbs/min)	TOTAL PER MONTH (hrs/min)	MAINTENANCE FACTOR (%)					
28	20-31	32-35	28-30	41-45	45-53	02-05				

(FIST 1-3 12/89)

III. Monthly Report of Transmission System Outages

Figure 8 (sheets 1 and 2) is an example of a completed form PO&M-62. One report is to be prepared for each operating area, covering all transmission system outages in the area during the reported month. The report shall be distributed within the region as specified by the Regional Director, with a copy to the Chief, Facilities Engineering Branch, Denver Office, Denver, Colorado. The copy for the Denver Office shall be forwarded to reach that office by the 20th day of the month following the reported month.

Information on these forms is intended for use in ADP applications. The data will be collected by the Denver Office for storage and subsequent retrieval for various purposes including the preparation of annual summaries. Quantities to be so treated are those appearing in boxes or columns whose headings are enclosed by heavy borderlines. Associated with each block or column heading appears one or two numbers. These indicate the range of columns assigned on a standard 80-column ADP data format. See "SPECIAL INSTRUCTIONS" in part A, section II of this chapter regarding the recording of data intended for use in ADP applications.

Instructions for reporting under the various headings, essentially in the sequence in which they appear on the form, are as follows:

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(1)	Region	Reclamation geographical region. This is represented by a numerical equivalent: 1 - PN Region 2 - MP Region 3 - LC Region 4 - UC Region 6 - GP Region
(2)	Date	Insert a <u>four-digit</u> abbreviation for the year and month - e.g., 8702 for February 1987, or 8711 for November 1987.
(3)	Card	This block contains a preprinted number for ADP use.
(4)	Day	For each individual outage, insert a <u>two-digit</u> figure for proper day of month - e.g., 01 for the 1st day or 22 for the 22nd day. List events chronologically for the month.
(5)	Time	Insert a four-digit figure to indicate, to the closest minute, the time of day at which the outage occurred, measured on a 24-hour time basis - e.g., 0029 represents 12:29 a.m. or 29 minutes after midnight; 1537 represents 3:37 p.m. List events chronologically for the day.

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(5)	Time (continued)	<p>After completing all entries for an individual outage, draw a horizontal line completely across the form before starting entries for the next outage.</p> <p>For a prolonged outage extending from the preceding month, insert <u>four zeros</u> in this column, and "01" in the "Day" column on the first line of the report for the new month. In subsequent columns repeat all information that appeared for the outage entry on the previous month's report, <u>except</u> for the "Duration" column. In the "Duration" column, report only the extent of the outage during the current month. (See notation on sample form PO&M-62, fig. 8, sheet 1 .)</p> <p>If entries for any single outage are so extensive as to require continuation on a following page, indicate "continued on next page" at the bottom of the one sheet, and "continued from preceding page" at the top of the next sheet. On the first line of data at the top of the following page, <u>repeat</u> outage information in the columns headed "Day," "Time," "Type of Fault," "Customer Service Interrupted," "Outage Type" and "Outage Cause or Reason" [items (4), (5), (11), (12), (13a), and (13b), respectively].</p> <p>For the condition of a prior breaker and/or relay operation observed during periodic rounds of inspection at an unattended station, record the date and time of inspection or relay resetting, and explain in "Remarks" column. (See notation for 12th day of the month on sample Form PO&M-62, fig. 8.) Should an inspection disclose several such operations since the last previous inspection, for example a total of X operations, make one entry as described immediately above, then on the next line <u>place an asterisk (*) in both the "Day" and "Time" columns</u>, followed by the notation in parentheses" Repeat data on line above X-1 times." (See entry for 14th day of the month on sample form PO&M-62, fig. 8, where X = 9.)</p>
(6)	Station, Line, Line-section, or Tap:	
(6a)	Name or Terminals	<p>For an outage at a station, or of a transmission line, section of a line, radial line or tap line, report the name of the station or terminals of the line involved, using approved code designations appearing in FIST Volume 4-2, "Power O&M Codes for ADP." When</p>

Item (sequence)	Heading	Description
(6a)	Name or Terminals (continued)	<p>identifying a line by its two terminals, it is <u>essential</u> for subsequent ADP applications that the <u>sequence prescribed in Bulletin No. 29 be used</u>: for example, YT-CU for the Yellowtail-Custer 230-kV line, not CU-YT. While the computer can be programmed to recognize that a line from A to B and a line from B to A are identical facilities, it involves unnecessary running time and expense.</p> <p>For the few instances of a tieline between two regions, such as the Green Mountain-Hayden 138-kV line, or between two operating areas within a single region, such as the Bismarck-Oahe 230-kV line, the reporting offices concerned shall mutually agree which office shall furnish all information for the entire line, including <u>all</u> sections thereof, taps thereto, and intermediate stations thereon. Data for each such line or intermediate stations thereon shall appear in the report for <u>one operating area only</u>.</p> <p>The type of reporting required for several conditions of line and station outages can be described most easily by reference to figure 8, the sample of a completed form PO&M-62.</p> <p>First, consider the case of a single transmission line between two terminals ALF and XV. The line is protected by a single breaker at each end, and includes no intermediate switching facilities, loads, or tap points. If a breaker opens at either end, or if both breakers open, the occurrence should be reported as an outage. The outage duration would be the time elapsed between opening of the first breaker and closure of the last breaker. If the duration was <u>1 minute or less</u>, it should be reported as "MOM" (momentary) as indicated in figure 8 for the first day of the month at 0029 hours. If the outage was of extended duration (greater than 1 minute), the entry should be of the form for the 27th day of the month at 2207 hours.</p> <p>Next, consider the condition of the same line as above, protected by more than a single breaker at one or both terminals. This would occur if either a ring bus, breaker-and-a-half, or double-bus-double-breaker arrangement were in use at one terminal, or both. For this case, the line should be reported as experiencing an outage <u>only</u> when through power flow from one end to the other was not possible. The outage duration to be reported would be the length of time that condition existed.</p>

Item (sequence)	Heading	Description
(68)	Name or Terminals (continued)	<p>Next, consider some cases of outages on a more complicated system arrangement involving intermediate line sections, loads, tap lines, and switching facilities between terminal breakers, such as the hypothetical system arrangement shown in figure 10.</p> <p>Consider first the case of a fault somewhere on the system between P and Q, and assume that in the process of clearing the fault and restoring service, <u>all facilities between P and Q were deenergized for exactly the same period of time.</u></p> <p>The type of entry requires is that shown in figure 8 for the 4th day of the month at 0850 hours. Note that entries appear for the main line P-Q, and for each of the intermediate substations R and T. <u>For this condition of the outage duration being equal for all facilities between P and Q, separate entries are not required and should not be made for intermediate sections of the main P-Q line</u> such as P-R, R-S, and S-Q, or for radial or tap lines such as S-T. In the case of a <u>station which contains more than one bus,</u> such as R, <u>separate entries are required for each bus</u> experiencing an outage, rather than a single entry for the complete station.</p> <p>Every bus and voltage must be separately identified.</p> <p>Now consider the more complicated condition of an outage on the system of figure 10, in which different outage durations occur for several of the facilities between P and Q. Such a condition might develop from the following sequence of events:</p> <ul style="list-style-type: none"> (a) A permanent fault at the location "X" on the R-S line section, causing breakers at P and Q to open simultaneously and lock open. (b) After location of the fault at X, isolation of the R-S line section for repair by opening sectionalizing switches S-1075 and R-2071. (c) Restoration of service to station R by closing breaker P-472. (d) Following (c), restoration of service to T by closing breaker Q-672. (e) After completion of the repair work, reenergization of line sections R-S by closing switch R-2071.

Item (sequence)	Heading	Description
(6a)	Name or Terminals (continued)	<p>(f) Following (e), closure of switch S-1075 to reestablish continuity of the complete line between P and Q.</p> <p>The type of entry required for a condition of this type is indicated in figure 8 for the 4th day of the month at 1625 hours. Note that entries are required for the complete line P-Q; for each of the Intermediate line sections P-R, R-S, and S-Q; for the tap line S-T; for the station T; for both the 69-kV and 57-kV buses at the station R; and for the 13.8-kV bus at station T. <u>Note especially that when intermediate sections of a complete line experience different outage times, the outage duration for the complete line between breakers is to be indicated by a series of zeros.</u></p> <p>Some other outage conditions require special consideration; such as (1) that of a line being Intentionally deenergized <u>for operational reasons</u> but being instantaneously available for reenergization and return to normal service; and (2) entries concerning non-Reclamation facilities (lines, plants, or stations), or operation of Reclamation equipment through which connection is made to another (foreign) utility.</p> <p>The condition of Intentionally switching a line out of service for <u>operational reasons</u>, but having it instantaneously available for reenergization and return to normal service whenever desired, <u>should be reported</u> as an outage for the duration applicable. This special type of operational outage should be identified by the <u>code "i"</u> inserted in a subsequent column headed "<u>Outage-Type</u>." Also see discussion under item 11a.</p> <p>The development of records on outages of non-Reclamation facilities is of no primary concern to Reclamation, unless, by contract, Reclamation has some operational or maintenance responsibility over such facilities. Consequently, no codings are included in FIST Volume 4-2 for non-Reclamation facilities (transmission lines, plants, substations, etc.).</p> <p>It is realized, however, that in many of our power operation centers, the PO&M form 62, both in its present version and in its earlier form of "Electric Service Interruptions," frequently is the only consolidated chronological record of power system outages and service interruptions for a large Interconnected network, <u>including</u> numerous important non-Reclamation</p>

Item (sequence)	Heading	Description
(6a)	Name or	<p data-bbox="690 233 1370 386">facilities. As such it could contain pertinent data, and might be the only source from which information might be reconstructed regarding the time, duration, cause, location, and effects of system disturbances originating on either Reclamation or non-Reclamation systems.</p> <p data-bbox="690 422 1433 705">There are no objections to the continued recording of outage or service interruption data on important foreign interconnecting facilities. It is essential, however, that non-Reclamation ownership of such facilities be indicated in a subsequent column on the form headed "Foreign Owner" (see Item 9). Approved codes for numerous "foreign" utilities are listed in various sections of FIST Volume 4-2. No provisions are made in the ADP procedures for storing any operational or maintenance information on non-Reclamation facilities, however.</p> <p data-bbox="690 741 1438 1089">While certain of the procedures outlined above may require somewhat more recording than was required previously by the field offices to describe a specific outage, they will develop Reclamation-wide uniformity in reporting, and will permit direct transcription of data to ADP components for subsequent retrieval. Two of the laborious tasks of which the field offices consequently will be relieved are the preparation of the Annual Summary of Transmission Line Outages and the Annual Summary of Substation Outages. In addition, the preparation or updating of other periodic information, such as the System Reliability Criteria and Standards Study, will be expedited.</p>
(6b)	Type	<p data-bbox="690 1125 1370 1535">An entry must be made in this column for every facility reported as experiencing an outage. Identify the facility (transmission line, switchyard, or substation) by approved single-letter code designation appearing in FIST Volume 4-2. Make certain that designation of these facility type codes conforms to the most recent revision of FIST Volume 4-2. For the purposes of this report, a "switchyard" is defined as the switching and transformation facility directly associated with a powerplant or a pumping-generating plant; all other switching and transformation facilities are considered "substations." The computer will recognize only the following codes in this column: "C, H, L, P, S, U, or X."</p> <p data-bbox="690 1570 1417 1698">It is necessary that each "type" code correspond correctly with the specific feature reported in the preceding column as experiencing an outage. For example, if the facility is a substation, it <u>must</u> be coded "H"; if a pumping</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(6b)	Type (continued)	plant - "U"; if a transmission line - "L"; etc. Conflicting information will not be recognized and accepted by the computer program, such as a type "T" or "L" for a substation, "S" for a transmission line, etc.
(6c)	KV	Indicate nominal voltage of every facility (line, substation, bus, etc.) in kV, with no more than one figure to the right of the decimal point.
(6d)	Bus:	
(6d-1)	Section	In the event operation of equipment results in a bus outage at a station which contains two or more bus sections at the same voltage, identify the particular bus section(s) involved, such as "1," "A," "NW" for Northwest, etc. Confine the designation to a maximum of four characters. Otherwise, leave this column blank.
(6d-2)	Dead	Indicate by "Y" for "yes" if equipment operation at a switchyard or substation resulted in deenergization of a bus section, even momentarily. For operation of one or more switches or breakers which did not result in an outage of a bus, indicate "N" for "no." <u>Every entry for an individual bus within a station, should include either a "Y" or "N" in this column. This column should be blank for all entries concerning transmission line or transmission cable outages.</u>
(7)	Duration	<p>This column <u>always</u> should have all entry for each facility outage reported. If the duration is <u>1 minute or less</u>, indicate "MOM" (momentary). If <u>more than 1 minute</u>, indicate the extent in hours and/or minutes, with a colon separating hours and minutes. The duration to be indicated for a variety of representative outage conditions can best be described by reference to the sample form PO&M-62, figure 8. It should be noted that some of the following instructions differ from those contained in earlier issues of this document.</p> <p>For a short-duration outage on a line with no intermediate sections or other facilities between the terminals, the duration to be reported, even if the breaker(s) opened at only one end, would be "MOM" (momentary) if 1 minute or less, such as the entry for the 1st day of the month at 0029 hours. If the outage was longer, the duration to be reported would be the elapsed time that the line was not available for through power transfer, such as the entry for the 27th day of the month at 2207 hours.</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(7)	Duration (continued)	<p>For the condition of <u>all facilities</u> between stations P and Q of figure 10 <u>experiencing an outage of equal time</u>, the duration to be reported is the <u>elapsed time</u> that all the affected <u>facilities were deenergized</u>. See entry for the 4th day of the month at 0850 hours.</p> <p>The entries in figure 8 for the 4th day of the month at 1625 hours illustrate the procedure for recording outages of different durations for the various components of a system sectionalized between terminal breakers like the system of figure 10. Note that for this case only, the outage duration to be indicated for the complete P-Q line is a series of zeros. For all intermediate components between P and Q (line sections, taplines, and/or stations), the outage duration to be indicated is the actual time each facility was deenergized.</p> <p>For the condition of one or more breaker and/or relay operations discovered during routine rounds of inspection at unattended stations, "MOM" should be indicated in this column (see entries on sample form PO&M-62, fig. 8, for the 12th and 14th days of the month).</p>
(8)	Breaker Tripped	Indicate by station designation (ADP abbreviation in FIST Volume 4-2), and assigned breaker number, the breaker(s) tripped during the outage. Use individual entry on separate line for each breaker designation with associated relay information.
(9)	Foreign Owner	If the entry concerns a non-Reclamation facility (line, plant, or station), or operation of Reclamation equipment through which connection is made to a "foreign" utility, indicate that utility, using the approved code designation appearing in FIST Volume 4-2 . <u>Otherwise, leave space blank.</u>
(10)	Relays Operated:	
(10a)	Type	Show relay type, as designated by device number on station single-line diagram. If more than one relay operated, use individual entry on separate line for information for each relay. If the outage did not result from relay operation but from manual operation of a breaker or switch, enter "MANUAL" in this column.
(10b)	Targets	If multiple target indications are possible on a particular relay, show the relay target(s) indicated, such as "I" for Instantaneous, "T" for Time-delay, ";Z1" for Zone 1, "Z-2" for Zone 2, "TT" for Transfer Trip, etc. If identification

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(10b)	Targets (continued)	of specific phase(s) Involved is considered desirable, add it in the "Remarks" column.
(11)	Type of Fault	<p>For forced outages resulting from electrical faults, indicate by 3PH, L-L, 2LG, L-G, 1LO, or 2LO If the fault was three-phase, line-to-line, double-line-to-ground, single-line-to-ground, 1 line open, or 2 lines open, respectively. If fault type was unknown, uncertain or undetermined, show "UNK."</p> <p>For other forced outages, such as system oscillations or the intentional removal of equipment from service to prevent damage or failure, leave this column blank. This column also should be left blank for all scheduled (S) and operational (i) type outages.</p>
(12)	Customer Service Interrupted	This column should contain an entry for each facility experiencing an outage for which an entry is made under item 6a . Use "Y" (yes) to indicate that service to a Reclamation customer was interrupted, "N" (no) that there was no interruption, or 'T' (interconnection) to indicate that service was supplied by wheeling over an interconnected foreign system and it was not known whether any off-system Reclamation customer suffered an interruption in service as the result of the reported outage.
(13)	Outage:	
(t 3a)	Type	<p>Indicate by "F," "S," or "i " whether the outage was forced, scheduled, or operational.</p> <p>A <u>forced outage</u> results from emergency conditions requiring that essential equipment be taken out of service immediately, either automatically or as soon as switching operations can be performed, or results from improper operation of equipment or employee error.</p> <p>A <u>scheduled outage</u> results when equipment is deliberately taken out of service at a selected time, usually for purposes of construction, maintenance or repair.</p> <p>A key test to determine whether an outage should be classified as forced or scheduled is as follows: If it is possible to defer the outage, it is a scheduled outage; otherwise it is a forced outage. Deferring an outage may be desirable, for example, to prevent overload of other facilities or an interruption of service to customers.</p>

<u>Item (sequence)</u>	<u>Heading</u>	<u>Description</u>
(13a)	Type	If the outage involved a transmission line Intentionally switched out of service for <u>operational reasons</u> , insert "i .". This code should be used <u>only</u> to designate the condition of a line removed from service for control of system voltage, reduction of light-load line charging, or regulation of reactive-power distribution, but being instantaneously available for reenergization and return to normal service whenever required.
(13b)	Cause or Reason	Indicate the cause or reason for the outage, using <u>only</u> the standard codings for this item given in section 4.7.2, "CAUSE OR REASON CODES," of Fist Volume 4-2 . If the outage was caused by an operator's action to minimize or prevent damage to equipment, insert "EDP," equipment damage prevention. If the cause or reason for the outage was unknown, uncertain, or undetermined, show "UNK."
(14)	Remarks	Provide any pertinent remarks or comments considered necessary to amplify preceding information.

MONTHLY REPORT OF TRANSMISSION SYSTEM OUTAGES

SHEET 1 OF 2

REG.	DATE	CARD
1	6-8	10-11
9	8711	14

OPERATING AREA Blackwater MONTH November YEAR 1987

DAY TIME	STATION, LINE, LINE SECTION, OR TAP				DURATION (HRS:MIN)	BREAKER TRIPPED (STA.-NO.) (1)	TORN OR REPAIR (2)	RELAYS OPERATED		TYPE OF FAULT (3)	CAUSE (4)	OUTAGE (5)	REMARKS
	NAME OF TERMINALS (1)	TYPE (2)	KV	BUS SECT				TYPE	TAR-GETS				
01 0000	PIIK	H	230		N 192:15	PIK-456					N S	MAI	Completed uprating of breaker started October 18.
01 0029	AIF-XV	L	230		M/M	AIF-1492 XV-892		94 16763 L		L-G	N	F LIG	Lightning in Xavier area.
04 0850	P-Q	L	138		0:07	P-472 Q-672		121 22 1676 L		2LG	Y	F WIN	High winds in Salem area.
04 1625	P-Q	L	138		00000	P-472 Q-672 Q-672		121 22 121 21 1676 L		UNK	Y	F TCF	Broken crossarm on structure 17/3 of Randolph-Salem line section. Service restored to Randolph from Palmer at 1737. Service restored to Tabor from Quay at 1935. Crossarm replaced on structure 17/3 and Randolph-Salem line section reenergized at 0650 November 5, by closing R-2071. S-1075 closed at 0740 November 5.
06 1414	MED	S	230	SW	3:45	MED-582 MED-782 MED-1182 MED-1782		187B1		1LG	N	F MEC	Welded joint failed on "AV" phase of southwest section of 230-kV bus at Medford Powerplant Switchyard.
08 0921	GF	H	230		0:32	GF-582	NAB	121 21			N	S TES	Staged 3-phase fault test on GF-MIV line following change of relay settings.

(1) REFER TO FIRST VOLUME 4-2 FOR IMPROVED CODING. (2) CUSTOMER SERVICE INTERRUPTED.
REFER TO FIRST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING.

MONTHLY REPORT OF TRANSMISSION SYSTEM OUTAGES

SHEET 2 OF 2

REC. NO.	DATE	CARD
1	6-9	10-11
9	8711	14

OPERATING AREA Blackwater MONTH November YEAR 1987

DAY	TIME	STATION, LINE, LINE SECTION, OR TAP			DURATION (HRS:MIN)	BREAKER TRIPPED (STA.-NO.)	OWNER (C)	RELAYS OPERATED		TYPE OF FAULT (C)	CL. INT. (R)	OUTAGE TYPE (C)	REMARKS
		NAME OR TERMINALS (1)	KV	BUS SECT				TYPE	TARGETS				
12	1550	WM	12.5		N	WM-124	50-52	151G		UNK	Y	F	Time of reset. Operating time unknown.
13	0017	FR-UJ	L 230		8:04						N		Control of light-load voltage in St. Fall and South Center areas over weekend.
		UJ-SF	L 230		8:05						Y		
		UJ-SC	L 230		8:06						Y		
14	0945	WP	H 34.5		N	WP-742	50-52	UNK	UNK	UNK	Y	F	Time of reset. Operating time unknown.
*	*	(Repeat data on line above 8 times.)											
27	2207	ALF-XV	L 230		1:43	XV-892		167G3 I 94		L-G N	N	F	Lightning in Xavier area. XV-892 reclosed successfully. ALF-1492 failed to reclose due to trouble in closing circuit.
						ALF-1492							Trouble on North-South Power Co. 115-kv system.
27	2309	CH	H 115		0:04	CH-762	NSP	187T		UNK	I	F	

(1) REFER TO FIRST VOLUME 4-2 FOR APPROVED CODING. (2) CUSTOMER SERVICE INTERRUPTED.
REFER TO FIRST VOLUME 1-3 FOR DETAILED INSTRUCTIONS ON REPORTING.

MONTHLY REPORT OF TRANSMISSION SYSTEM OUTAGES

SHEET _____ OF _____

REG.	DATE YR. MO. SE.	CARD 10-11
(1)	(2)	(3)

OPERATING AREA _____ MONTH _____ YEAR _____

DAY TIME	STATION, LINE, LINE SECTION, (6a)				DURA- TION (HRS:MIN)	BREAKER TRIPPED (STA.-NO.) (1)	NO. & Z OF OVER- LOADS (2)	RELAYS OPERATED		FAULT (3)	CIRCUIT SER. (4)	OUTAGE REASON (5)	REMARKS (14)
	NAME OR TERMINALS (1)	TYPE (2)	KV	BUS SECT				TYPE	TAR- GETS				
14-15 16-19	20-26	27	20-31	32-35	36	42-48	50-52	53-59	60-65	66-67	68	69-71	
(4) (5)	(a)	(b)	(c)	(6d-1)	(7)	(8)	(9)	(10a)	(10b)	(11)	(12)	(13a)	
				(6d-2)								(13b)	

(1) REFER TO FIRST VOLUME 4-2 FOR APPROVED CODING. (2) CUSTOMER SERVICE INTERRUPTED.
REFER TO FIRST VOLUME 3-3 FOR DETAILED INSTRUCTIONS ON REPORTING.

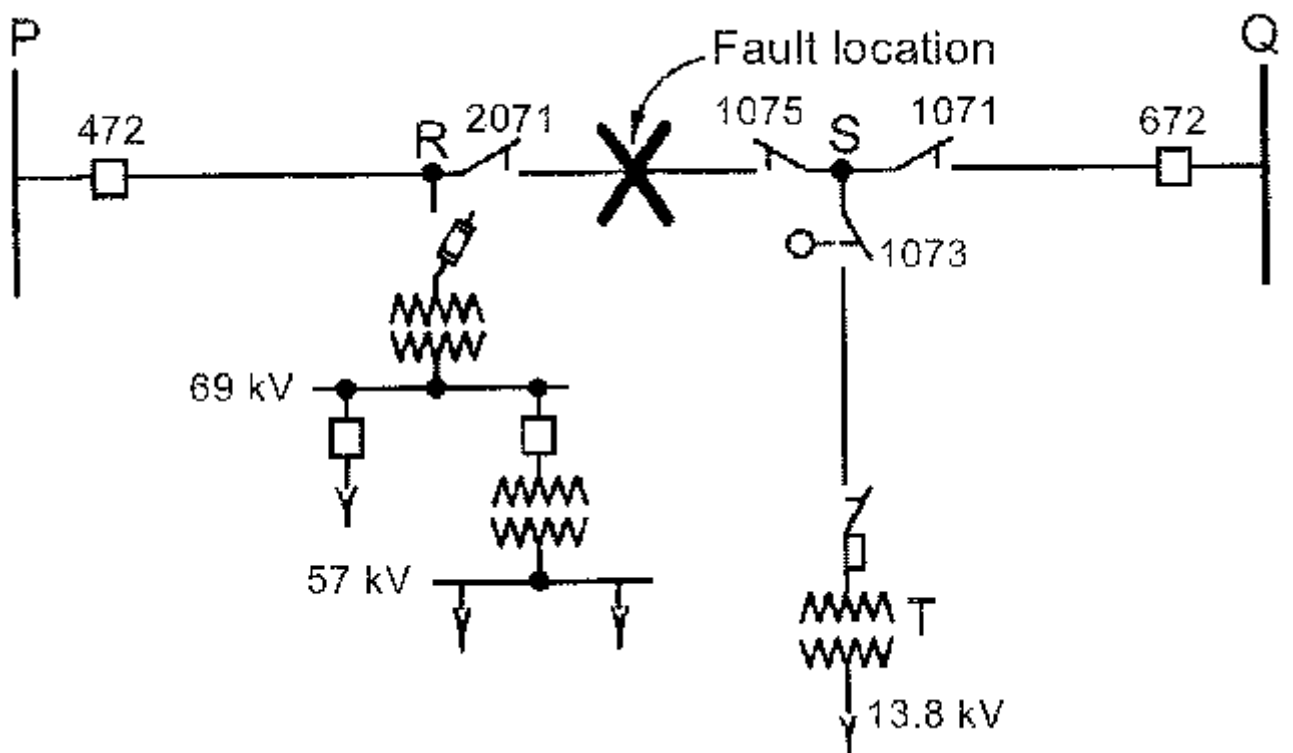


DIAGRAM OF HYPOTHETICAL POWER SYSTEM

Figure 10

IV. Statement of Power Production

Figure 11 is a sample of a monthly Statement of Power Production, PO&M Report 120. It is a monthly summary of generating information for all plants where power generation occurs (powerplants and pumping-generating plants) in which Reclamation is concerned with the operation, either directly, or as a joint participant. The report will be prepared in the Denver Office, using ADP procedures, including retrieval of information previously transcribed from monthly forms PO&M-59 and -59B.

Copies shall be furnished the Commissioner, Washington Office, and each regional office for distribution as stipulated by the Regional Director. The report shall be completed and ready for distribution by the end of the month following the reported month.

Following is a brief description of the various Items of information provided by this report:

<u>Item</u>	<u>Description</u>
(1) Installed Capacity	The same value for generating capacity reported on form PO&M-59 or -59B for each plant for the corresponding month.
(2) Net Generation	Quantity indicated for each plant on form PO&M-59 or -59B for the report month.
(3) Maximum Hourly Generation	Maximum generation during any single "whole" clock hour during the month for each plant.
(4) Plant Factor	Ratio, calculated by the computer, for each plant, of Gross Generation (as reported on report form PO&M-59 or -59B) to the product of hours in the month and Installed Generating Capacity, expressed in percent, and rounded to closest tenth of 1 percent.
(5) Utilization Factor	Ratio, calculated by the computer for each plant, of Maximum Hourly Generation (item 3) to Installed Generating Capacity (item 1), expressed in percent, and rounded to closest tenth of 1 percent.
(6) Net Generation and Maximum Hourly Generation for Same Period Last Year	Obtained from computer storage as items (2) and (3) in report for same month last year.

BUREAU OF RECLAMATION
STATEMENT OF POWER PRODUCTION

REG.	PROJECT	PLANT	NOVEMBER 1988										SAME PERIOD LAST YEAR	
			INSTALLED CAPACITY (KW)	NET GENERATION (KWH)	MAXIMUM HOURLY GENERATION (KW)	PLANT EFFECTIVENESS (%)	UTILIZATION		NET GENERATION (KWH)	MAXIMUM HOURLY GENERATION (KW)	PLANT EFFECTIVENESS (%)	FACILITY EFFECTIVENESS (%)	NET GENERATION (KWH)	MAXIMUM HOURLY GENERATION (KW)
							(1)	(2)						
PR	BOISE	ANDERSON RANCH	60,000	4,828,820	7,200	18.6	18.2		3,522,100	5,400			3,522,100	5,400
		BLAKE CANYON	3,000	3,451,000	8,900	51.4	100.0		2,147,400	7,800			2,147,400	7,800
		BOISE RIVER DIV	1,500	0	0	0.0	0.0		0	0			0	0
	COLUMBIA BASIN	GRAND COULEE	2,180,000	1,507,255,890	1,457,000	38.1	71.1		1,807,828,505	3,193,200			1,807,828,505	3,193,200
		GRAND COULEE P/C(3)	174,000	0	0	0.0	0.0		0	0			0	0
	HUNGRY HORSE	HUNGRY HORSE	185,000	30,888,900	2,000	19.2	32.3		10,714,500	184,000			10,714,500	184,000
	MINICOKE	MINICOKE	13,500	6,457,285	12,000	67.2	32.3		8,512,085	11,200			8,512,085	11,200
	PALISADES	PALISADES	302,400	48,118,900	47,000	19.5	20.3		12,949,400	31,000			12,949,400	31,000
	ROOSEVELT BASIN	ROOSEVELT SPRINGS	19,000	4,497,850	12,000	38.2	172.8		4,128,640	17,000			4,128,640	17,000
	YALUMA	CHANDLER	12,000	9,884,770	11,500	45.0	32.8		418,570	4,000			418,570	4,000
		ROSA	12,237	38,300	0	0.0	0.0		38,300	0			38,300	0
	TOTAL		7,208,462	1,973,092,350	4,821,400				5,892,564,850	5,426,100			5,892,564,850	5,426,100
	CHANGE FROM LAST YEAR			279,513,564	-619,700									
NA	CENTRAL VALLEY	JUDGE F. CARR	154,400	25,345,950	151,000	22.8	37.0		48,434,700	81,000			48,434,700	81,000
		FOLSON	180,100	29,101,210	105,000	21.7	59.8		23,478,800	111,000			23,478,800	111,000
		KESWICK	75,000	26,653,510	45,000	53.1	67.0		17,440,400	20,000			17,440,400	20,000
		NEW MELNOR	305,000	11,118,320	125,000	5.2	41.7		6,874,740	124,000			6,874,740	124,000
		KIMBUS	215,000	3,426,700	6,000	2.8	2.8		3,232,700	7,000			3,232,700	7,000
		SPRING CREEK	150,000	39,448,800	26,000	22.8	93.3		80,354,240	123,000			80,354,240	123,000
		ST. MELL	25,000	0	0	0.0	0.0		0	0			0	0
		SHASTA	439,000	726,378,240	40,000	32.7	3.4		64,949,210	321,000			64,949,210	321,000
		SAN LUIS	202,000	0	0	0.0	0.0		0	0			0	0
		TRINITY	140,280	23,126,428	151,000	73.9	38.2		38,817,060	40,000			38,817,060	40,000
	TOTAL		2,620,170	275,893,208	499,800				227,805,415	345,000			227,805,415	345,000
	CHANGE FROM LAST YEAR			41,382,782	-265,200									
SA	SOUTHERN CANYON	HOOPER	1,385,000	604,172,400	338,740	47.3	51.2		516,400,400	1,382,500			516,400,400	1,382,500
	CENTRAL ARIZONA	NAVAJO	384,000	285,008,000	161,720	148.0	154.1		29,124,000	307,418			29,124,000	307,418
	PARKER-DAVIS	DAVIS	442,000	122,103,000	240,000	38.3	54.3		122,277,000	198,000			122,277,000	198,000
		PARKER	120,000	59,550,820	100,000	59.3	43.2		69,201,104	79,000			69,201,104	79,000
	TOTAL		2,331,000	1,041,173,220	2,230,480				585,032,204	1,627,067			585,032,204	1,627,067
	CHANGE FROM LAST YEAR			83,140,824	709,400									
UC	COLLIERAY	LOWER HOLTHA	4,000	1,545,900	4,000	53.0	24.7		1,612,200	2,700			1,612,200	2,700
		UPPER HOLTHA	4,000	3,209,000	4,000	51.9	24.8		3,321,300	4,000			3,321,300	4,000
	COLD RIVER STORAGE	BLUE MESA	80,000	27,467,270	87,000	64.6	17.7		28,072,644	88,000			28,072,644	88,000
		CRYSTAL	35,000	19,037,308	29,000	54.0	100.0		19,378,928	25,000			19,378,928	25,000
		PLAMING GORGE	108,000	44,211,000	126,000	103.3	113.5		54,321,600	127,000			54,321,600	127,000
		ELLEN CANYON	1,247,214	111,504,474	1,242,000	86.2	85.6		350,322,007	275,000			350,322,007	275,000
		MORROW POINT	222,000	32,100,915	140,000	14.5	43.5		24,219,300	112,000			24,219,300	112,000
	ARROW RIVER	DEER CREEK	4,300	2,258,815	3,250	67.8	82.0		782,454	1,100			782,454	1,100
	SEEDSKAGNE	MONTENELLE	10,000	46,000	0	0.0	0.0		46,000	0			46,000	0
	TOTAL		1,194,000	282,377,789	1,821,450				412,905,220	1,347,300			412,905,220	1,347,300
	CHANGE FROM LAST YEAR			308,478,618	273,250									
SW	FALCON DAM (BAND)	FALCON	31,500	8,227,400	24,200	0.0	0.0		0	0			0	0
	RIO GRANDE	ELEPHANT BUTTE	24,300	0	0	57.2	116.0		0	0			0	0
	TOTAL		55,800	8,227,400	24,200				0	0			0	0
	CHANGE FROM LAST YEAR			10,011,740	28,200									
UN	FORT PECK	FORT PECK	145,200	98,232,000	105,000	47.7	18.3		35,248,000	170,000			35,248,000	170,000
	PICK-SLOAN NO. BASIN	ELC BEND	458,000	100,823,000	430,000	39.1	103.2		20,222,000	481,000			20,222,000	481,000
		CANYON FERRY	50,000	41,041,232	58,000	116.7	116.0		76,238,028	56,000			76,238,028	56,000
		FORT RANDALL	45	122,000	103,400	211,000	61.3	36.7	15,179,000	264,000			15,179,000	264,000
		GARAJON	45	430,000	326,873,000	115,000	73.1	40.2	133,188,000	115,000			133,188,000	115,000
		GAYNES POINT	45	109,300	30,343,000	115,000	12.0	13.0	75,805,000	855,000			75,805,000	855,000
		DAHS	45	885,000	223,215,000	828,000	36.3	105.2	297,282,000	855,000			297,282,000	855,000
		YELLOWTAIL	250,000	47,287,400	226,000	61.3	96.0		60,408,720	172,000			60,408,720	172,000
	TOTAL		2,804,280	1,078,182,125	2,272,000				817,278,748	2,272,000			817,278,748	2,272,000
	CHANGE FROM LAST YEAR			25,783,387	55,000									
LM	SHILOH-614 THOMPSON	BLG THOMPSON	4,000	14,130	0	0.0	0.0		17,100	0			17,100	0
		ESTER	45,000	7,062,420	47,000	23.8	164.0		7,974,280	23,000			7,974,280	23,000
		FLATIRON	86,000	14,258,428	88,000	34.8	78.9		15,811,014	50,000			15,811,014	50,000
		FLATIRON	212,000	0	0	0.0	0.0		0	0			0	0
		GREEN MOUNTAIN	26,000	4,056,000	7,000	27.7	21.0		8,335,300	10			8,335,300	10
		MORSE LAKE	3,100	2,258,800	1,000	51.1	101.1		2,355,300	7,000			2,355,300	7,000
		POLE HILL	33,250	9,353,400	24,000	37.6	102.3		12,213,600	23,000			12,213,600	23,000
	FOYINOMAN-ARKANSAS	MT. ELBERT	300,000	725,000	17,000	0.6	34.6		12,310,000	108,000			12,310,000	108,000
	KENDALCE	ALCOYA	38,000	12,220,417	15,000	47.8	24.4		8,041,000	13,000			8,041,000	13,000
		SEMINOLE	45,000	8,238,222	26,000	28.0	56.8		11,056,233	72,000			11,056,233	72,000
		QUERASBY	4,000	3,413,313	9,000	100.2	125.0		10,512	0			10,512	0
		BOYSSON	217,000	2,343,200	13,000	5.6	1.0		3,868,000	8,000			3,868,000	8,000
		FRONT CANYON	45,000	18,322,230	26,000	67.8	54.2		16,439,376	45,000			16,439,376	45,000
		OLBAND	34,000	4,088,300	2,000	16.5	22.7		185,300	0			185,300	0
		MORTZ	38,000	10,143,200	16,000	39.2	33.4		12,807,400	27,000			12,807,400	27,000
		PILOT BUTTE	1,000	0	0	0.0	0.0		0	0			0	0
		SHOSHONE	5,000	32,300	0	0.0	0.0		41,500	0			41,500	0
		SHOSHONE	5,012	0	0	0.0	0.0		0	0			0	0
		WINDY HORN (INTER DIV)	4,000	14,721	0	0.0	0.0		14,721	0			14,721	0
	TOTAL		7,056,202	504,113,625	230,000				104,964,193	376,110			104,964,193	376,110
	CHANGE FROM LAST YEAR			-540,324	4,920									
	TOTAL		17,123,130	4,908,789,177	11,853,513				4,476,447,972	12,303,607			4,476,447,972	12,303,607
	CHANGE FROM LAST YR			49.8	19.4									

(1) TOTALS ARE NON-COINCIDENTAL. NO METERING AT BENARD WASH TO PROVIDE MAXIMUM HOURLY GENERATION.

(2) THESE FACTORS ARE MEASURES OF PLANT PERFORMANCE DURING THE PERIOD PLANT FACTOR IS RATIO OF AVERAGE GROSS GENERATION TO INSTALLED CAPACITY. UTILIZATION FACTOR IS RATIO OF MAXIMUM HOURLY GENERATION TO INSTALLED CAPACITY.

(3) PUMPING-GENERATING PLANT OR UNIT. SAN LUIS QUANTIFIERS ARE FEDERAL SHARE.

(4) PLANT OWNED & OPERATED BY CORP. OF ENGINEERS. POWER MARKETING BY RECLAMATION.

(5) PLANT OWNED & OPERATED BY INTERNATIONAL BOUNDARY AND WATER COMMISSION. POWER MARKETING BY RECLAMATION.

(6) BUREAU'S SHARE OF NAVAJO STEAMPLANT CAPACITY UNDER TERMS OF NAVAJO PARTICIPATION AGREEMENT.

B. Annual Reports

I. Statement of Power Production

Using the same basic format as the monthly Statement of Power Production (PO&M Report 120), two similar reports are prepared for annual periods, one for the fiscal year (PO&M Report 120FY) and the other for the calendar year (PO&M Report 120CY). Preparation instructions, distribution, completion dates, etc., are the same as for the monthly report, with the following exceptions for Items report under certain headings.

	<u>Item</u>	<u>Description</u>
(1)	Installed Capacity	The quantity applicable at the end of the annual reported period.
(2)	Net Generation	Quantity applicable for the complete year.
(3)	Maximum Hourly Generation	Maximum generation during any single "whole" clock hour during the year.
(4)	Plant Factor	Based on total Gross Generation for the plant for the year as determined from monthly data on forms PO&M-59 or -59B.
(5)	Utilization Factor	Ratio, calculated by the computer, of Maximum Hourly Generation during the year (item 3) to Installed Capacity at the end of the year (Item 1).
(6)	Net Generation and Maximum Hourly Generation for Same Period Last Year	Obtained from computer storage as Items (2) and (3) in annual report for corresponding prior calendar or fiscal year as applicable.

II. Annual Summary of Transmission Line and Cable Outages

Figure 12 is an example of a partially completed PO&M Report 129. This report provides an annual two-part summary of the total number, duration, major causes, rates, etc., of transmission line outages, and of transmission cable outages, both forced and scheduled, for every transmission line and cable. The report will be prepared in the Denver Office, using ADP procedures, including retrieval of information previously transcribed from monthly forms PO&M-62.

Copies shall be furnished the Commissioner, Washington Office, and each regional office for distribution as stipulated by the Regional Director. The report shall be completed and available for distribution by the end of January following the reported year.

Following is a brief description of the various items of information provided by this report:

	<u>Item</u>	<u>Description</u>
(1)	Calendar Year	The calendar year which the report covers. (There may be occasions where use of this same basic format may be desired for summarizing transmission line and cable outage information for some period other than a calendar year, in which event changes could be made as required in the report title, summary period, etc.)
(2)	Region	The geographical regions, in which the lines and cables are located. For the condition of an inter-regional tieline, such as the Hayden-Archer 230-kV circuit, data will appear only in the tabulation of information for the region responsible for its report (see part A, section III, item 6a , of this chapter).
(3)	Project	The projects of which the lines are a component part, arranged alphabetically within regions, using the approved project codings listed in FIST Volume 4-2 , "Power O&M Codes for ADP."
(4)	Transmission Line or Cable	
(4a)	Voltage	Design voltage of the line or cable in kV, with lines in one part of the tabulation and cables in the other part, arranged within each project in descending numerical order according to voltage level.
(4b)	Designation	The extent of the line or cable between terminals will be indicated using station names or approved abbreviations. The lines and cables will be listed generally in the order shown in the PLS Listing. In event there is more than one circuit at a particular voltage between the same terminals, the circuits will be uniquely identified using the same designations appearing on switching or operating diagrams, such as number, letter, compass direction, etc.

	<u>Item</u>	<u>Description</u>
(5)	Forced Outages:	
(5a)	Momentary (Number)	The total number of forced (unscheduled) outages, each with duration of 60 seconds or less, occurring during the reported period.
(5b)	Sustained	
(5b-1)	Number	Total number of forced outages, each with duration greater than 60 seconds, occurring during reported period.
(5b-2)	Total Duration	Accumulated duration of all sustained forced outages during reported period, expressed decimally In hours, and rounded to closest tenth.
(5c)	Major Cause	
(5c-1)	Frequency Basis	The single cause producing the greatest number of forced outages, momentary and sustained, during the reported period. Codes are Indicated in FIST Volume 4-2 . Should there be two or more causes with equal number, only one will be indicated, with a note that there were other(s) of equal amount.
(5c-2)	Duration Basis	The single cause producing the greatest total time of sustained forced outages during the reported period. Codes are Indicated in Fist Volume 4-2 . Should there be two or more causes with equal total duration, only one will be Indicated, with a note that there were other(s) with equal total duration.
(5d)	Main Type of Fault	The single type of fault producing the greatest number of forced outages, momentary and sustained, during the reported period. Codes are Indicated in FIST Volume 4-2 . Should there be two or more types of fault with equal number, only one will be indicated, with a note that there were other(s) of equal number.
(5e)	Rate	A measure of the relative performance of the line or cable under forced outage conditions; expressed as the total number of forced outages during the annual reported period, multiplied by 100, divided by the length of the line or cable in miles, then rounded to the closest hundredth.
(6)	Scheduled Outages:	
(6a)	Number	The total number of scheduled (prearranged) outages during the reported period. This does not include outages of Type "i " reported on monthly forms

	<u>Item</u>	<u>Description</u>
(6a)	Number (Continued)	PO&M-62 resulting from the intentional deenergization of lines for purely operational reasons, such as control of system voltage, light-load line charging, or reactive-power distribution. Under such circumstances, lines are considered instantaneously "available for service."
(6b)	Total Duration	Accumulated duration of all scheduled outages during reported period, expressed decimally in hours, and rounded to closest tenth.
(6c)	Rate	A measure of the relative performance of the line or cable under scheduled outage conditions; expressed as the total number of scheduled outages during the annual reported period, multiplied by 100, divided by the length of the line or cable in miles, then rounded to the closest hundredth.
(7)	Total Outages:	
(7a)	Number	Total number of outages, both forced and scheduled, occurring during reported period. (Note: Quantity in this column should equal the sum of items 5a, 5b-1, and 6a.)
(7b)	Total Duration	Accumulated duration of all outages, both forced and scheduled, occurring during the reported period, expressed decimally in hours, and rounded to the closest tenth. (Note: Should equal the sum of items 5b-2 and 6b.)
(8)	Service Factor	Measure of the "service availability" of the line or cable during the reported period; a percentage computed as total hours in the reported period, less total hours outage duration (item 7b), times 100, and divided by total hours in the period, then rounded to closest tenth of 1 percent. An asterisk preceding an indicated Service Factor of 100 percent signifies that any outage which did occur was "momentary" (duration no greater than 60 seconds).

UNITED STATES

BUREAU OF RECLAMATION

SUMMARY OF TRANSMISSION LINE AND CABLE OUTAGES

- NOTES: (1) CODINGS IN FORM BULLETIN NO. 29
(2) DURATION 60 SECONDS OR LESS
(3) DURATION MORE THAN 60 SECONDS
(4) PERCENT OF TIME IN SERVICE OR AVAILABLE FOR SERVICE
(5) EXCLUSIVE OF MOMENTARY OUTAGES
(6) OTHERS OF EQUAL VALUE
(7) COMPUTATION NOT MEANINGFUL

CALENDAR YEAR 1980

R: PROJ.	E: AND	G: -AGE:	I: AREA	O: -	N: (1)	TRANSMISSION LINE										SCHEDULED OUTAGES: TOTALS										SER- VICE
						DESIGNATION	FROM	TO	CAUSE	DATE	TIME	PER	TIME	PER	TIME	PER	N	U	M	B	F	R	E	P	HR:MN	(4)

(TRANSMISSION LINES)

C BCP	69.0	HOOPER DAM 69-KV SWYD BOULDER CITY	3	0	0:00	LIG	ITG	---	---	---	---	---	---	---	---	---	0	0	0:00	0:00	0:00	0:00	0:00	0:00	0:00	+100.0
	287.5	HOOPER POWERPLANT-CITY OF L.A. SWYD. NO.	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	2	16:10	889.86	2	16:10	889.86	2	16:10	99.8
	287.5	HOOPER POWERPLANT-CITY OF L.A. SWYD. NO.	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	1	8:50	384.62	1	8:50	384.62	1	8:50	99.9
	287.5	HOOPER POWERPLANT-CITY OF L.A. SWYD. NO.	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	1	4:40	243.90	1	4:40	243.90	1	4:40	99.9
	230.0	HOOPER POWERPLANT-MWD SWYD. NO. 1	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	2	25:00	714.29	2	25:00	714.29	2	25:00	99.7
	230.0	LIBERTY-WEST WING (ON DOUBLE CKT) WRS	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	1	10:49	---	1	10:49	---	1	10:49	99.9
	345.0	MEAD-LIBERTY	0	1	7:59	DEF	DEF	---	---	---	---	---	---	---	---	---	0	1	2:44	---	1	2:44	---	1	2:44	99.9
	161.0	BLUETH-KNOB	0	1	0:39	LIG	LIG	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	115.0	BOUSE-GILA	0	0	17:06	LIN	LIN	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	99.8
	115.0	CASA GRANDE-EMPIRE	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	3	20:25	17.44	3	20:25	17.44	3	20:25	99.8
PAI	115.0	COOLIDGE-ELEC. DISTRICT NO.2 (VIA SIGNAL)	0	1	0:14	DEF	DEF	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	115.0	COOLIDGE-SAGUARO	0	6	467:52	ELO	FLA	---	---	---	---	---	---	---	---	---	0	1	106:35	---	1	106:35	---	1	106:35	93.5
	69.0	DAVIS-CUC TAP (KINGMAN)	0	1	1:49	LIN	LIN	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	230.0	DAVIS PRESCOTT	0	1	0:09	TRG	TRG	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	69.0	DIWAL TAP-MEC KINGMAN TAP	0	1	20:56	LIN	LIN	---	---	---	---	---	---	---	---	---	0	2	8:16	26.67	2	8:16	26.67	2	8:16	99.7
	115.0	ELEC. DISTRICT NO. 2-ELEC. DISTRICT NO. 4	0	1	21:13	LIN	LIN	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	99.8
	115.0	FIFTH DISTRICT NO. 5-SAGUARO NO. 1	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	161.0	GILA-KNOB	0	1	0:42	TRG	TRG	---	---	---	---	---	---	---	---	---	0	1	4:36	5.85	1	4:36	5.85	1	4:36	99.9
	161.0	GILA-WELTON MOHAWK (P.P. #2)	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	3	82:02	44.55	3	82:02	44.55	3	82:02	99.3
	34.5	GILA-YUMA MESA TAP	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	1	5:35	7.87	1	5:35	7.87	1	5:35	99.9
PDP	230.0	HOOPER-RASC (NORTH BASIC LINE)	0	1	0:02	UNK	UNK	---	---	---	---	---	---	---	---	---	0	2	7:27	22.22	2	7:27	22.22	2	7:27	99.9
	115.0	MARIQUA-TUCSON	0	1	0:00	---	---	---	---	---	---	---	---	---	---	---	0	4	21:56	---	4	21:56	---	4	21:56	99.7
	115.0	MARIQUA-CASA GRANDE	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	1	6:53	4.22	1	6:53	4.22	1	6:53	93.9
	115.0	MARIQUA-SAGUARO	1	3	466:13	ELO	ITG	1-G	---	---	---	---	---	---	---	---	0	21	121:33	139.07	21	121:33	139.07	21	121:33	98.6
	230.0	MEAD-BASIC	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	3	21:39	---	3	21:39	---	3	21:39	93.5
	230.0	MESA COOLIDGE	1	0	0:00	REM	REM	---	---	---	---	---	---	---	---	---	0	3	21:39	---	3	21:39	---	3	21:39	93.5
	115.0	ORACLE-TUCSON	0	1	19:21	LIN	LIN	---	---	---	---	---	---	---	---	---	0	4	31:35	10.03	4	31:35	10.03	4	31:35	98.6
	69.0	PARKER-BAGDAD	0	1	0:02	UNK	UNK	---	---	---	---	---	---	---	---	---	0	3	426:34	12.00	3	426:34	12.00	3	426:34	94.9
	230.0	PARKER-GENE (MWD)	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0
	161.0	PARKER-HEADGATE ROCK	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	2	6:57	15.50	2	6:57	15.50	2	6:57	99.9
PDP	161.0	PARKER-PHOENIX NO. 2	0	2	465:14	UNK	UNK	---	---	---	---	---	---	---	---	---	0	1	30:11	---	1	30:11	---	1	30:11	94.4
	115.0	PHOENIX-COOLIDGE	0	0	0:00	---	---	---	---	---	---	---	---	---	---	---	0	4	856:22	7.62	4	856:22	7.62	4	856:22	90.3
	115.0	PHOENIX-MARIQUA	0	1	12:03	LIN	LIN	---	---	---	---	---	---	---	---	---	0	4	17:08	11.08	4	17:08	11.08	4	17:08	99.7
PDP	161.0	PILOT KNOB-EL CENTRO	0	1	0:02	LIG	LIG	---	---	---	---	---	---	---	---	---	0	0	0:00	---	0	0:00	---	0	0:00	100.0

III. Annual Summary of Substation Outages

Figure 13 is an example of a partially completed PO&M Report 130. This report provides an annual summary of the total number, duration, major causes and effects of outages in each major substation and switchyard. The report will be prepared in the Denver Office, using ADP procedures, including retrieval of information previously transcribed from monthly forms PO&M-62.

Copies shall be furnished the Commissioner, Washington Office, and each regional office for distribution as stipulated by the Regional Director. The report shall be completed and available for distribution by the end of January following the reported year.

For purposes of this report, an "outage" of a substation or switchyard will be considered to have occurred whenever a complete station, or any complete bus section within a station, becomes entirely deenergized, even momentarily.

Following is a brief description of the various items of information provided by this report:

	<u>Item</u>	<u>Description</u>
(1)	Calendar Year	The calendar year which the report covers. (There may be occasions where use of this same basic format may be desired for summarizing substation outage information for some period other than a calendar year, in which event changes could be made as required in the report title, summary period, etc.)
(2)	Region	The geographical regions, in which the stations are located.
(3)	Project	The projects of which the station is located, arranged alphabetically within regions, using the approved project codings listed in FIST Volume 4-2 , "Power O&M Codes for ADP."
(4)	Station:	
(4a)	Name	An alphabetical listing of only those major sub-stations and switchyards on each project which experienced an outage during the reported period.
(4b)	Bus Voltage and Section	<p>The voltage, in kV, of each station or bus reported. In the event there are several buses of different voltages in a station, or separate sections of a single-voltage bus each of which can be individually isolated, entries on separate lines of the report will summarize outage data for each reported bus section.</p> <p>If buses of different voltages in a single station experienced outages, they will be listed in descending numerical order.</p>

<u>Item</u>	<u>Description</u>
(5) Forced Outages:	
(5a) Momentary (Number)	Total number of forced (unscheduled) outages, each with duration of 60 seconds or less, occurring during the reported period.
(Sb) Sustained	
(5b-1) Number	Total number of forced outages, each with duration greater than 60 seconds, occurring during reported period.
(5b-2) Total Duration	Accumulated duration of all sustained forced outages during reported period, expressed decimally in hours, and rounded to closest tenth.
(5c) Major Cause	
(5c-1) Frequency Basis	The single cause producing the greatest number of forced outages, momentary and sustained, during the reported period. Codes are indicated in FIST Volume 4-2 . Should there be two or more causes with equal number, only one will be indicated, with a note that there were other(s) of equal amount.
(5c-2) Duration Basis	The single cause producing the greatest total time of sustained forced outages during the reported period. Codes are indicated in FIST Volume 4-2 . Should there be two or more causes with equal total duration, only one will be indicated, with a note that there were other(s) with equal total duration.
(5dj) Customer Service Interruptions	Total number of interruptions to customer service as the result of forced outages during the reported period. (Specific number of individual customers affected not included in tabulation.)
(6) Scheduled Outages:	
(6a) Number	The total number of scheduled (prearranged) outages at the station or on the station bus for the reported period.
(6b) Total Duration	Accumulated duration of all scheduled outages during reported period, expressed decimally in hours, and rounded to closest tenth.

	<u>Item</u>	<u>Description</u>
(6c)	Customer Service Interruptions	Total number of interruptions to customer service as the result of scheduled outages during the reported period. (Specific number of individual customers affected not included in tabulation.)
(7)	Total Outages:	
(7a)	Number	Total number of outages, both forced and scheduled, occurring during reported period. (Note: Quantity in this column should equal the sum of items 5a, 5b-1, and 6a.)
(7b)	Total Duration	Accumulated duration of all outages, both forced and scheduled, occurring during the reported period, expressed decimally in hours, and rounded to the closest tenth. (Note: Should equal the sum of items 5b-2 and 6b.)
(8)	Service Factor	Measure of the "service availability" of the line or cable during the reported period; a percentage computed as total hours in the reported period, less total hours outage duration (item 7b), times 100, and divided by total hours in the period, then rounded to closest tenth of 1 percent. An asterisk preceding an indicated Service Factor of 100 percent signifies that any outage which did occur was "momentary" (duration no greater than 60 seconds).

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SUMMARY OF SUBSTATION OUTAGES

(STATIONS NOT LISTED EXPERIENCED NO OUTAGES -
SERVICE FACTOR = 100 PERCENT)

CALENDAR YEAR 1980

:53:DN

- (1) COINGS IN POSM BULLTIM NO.29
(2) DURATION 60 SECONDS OR LESS
(3) DURATION MORE THAN 60 SECONDS
(4) PERCENT OF TIME IN SERVICE
* EXCLUSIVE OF MOMENTARY OUTAGES
AND OTHER(S) OF EQUAL COUNT

PROJECT REG. NO. AND ARFA	STATION	BUS	NAME	FORCED OUTAGES				SCHEDULED OUTAGES				TOTAL OUTAGES							
				MOMENTARY	SUSTAINED (3)	MAJOR CAUSE	CUST. SERVICE	TOTAL	CUST. SERVICE	TOTAL	INTRUP. (NO.)	DURATION: HRS	INTRUP. (NO.)	DURATION: HRS					
		VOLT-SEC- ARF. TION	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	
		(KV)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	
LC CRS	PINNACLE PEAK	330.0	0	1	71:07	ELE	ELE	0	2	5:10	0	3	77:17	99.1	99.1	99.1	99.1	99.1	
	ITRERTY	345.0	0	0	0:00	---	---	0	1	26:17	0	1	26:17	99.7	99.7	99.7	99.7	99.7	
		230.0	0	0	0:00	---	---	0	2	15:45	0	2	15:45	99.8	99.8	99.8	99.8	99.8	
	MEAD	230.0	0	1	7:59	DEF	DEF	0	0	0:00	0	1	7:59	99.9	99.9	99.9	99.9	99.9	
		230.0	0	3	508:17	LIN	TRQ	0	5	18:42	0	8	526:59	94.0	94.0	94.0	94.0	94.0	
	AMARGOSA	138.0	0	1	0:10	UNK	UNK	0	1	10:29	0	2	10:39	99.9	99.9	99.9	99.9	99.9	
		230.0	0	1	0:08	ERR	ERR	0	2	11:00	0	3	11:08	99.9	99.9	99.9	99.9	99.9	
		230.0	0	0	0:00	---	---	0	6	30:08	0	6	30:08	99.7	99.7	99.7	99.7	99.7	
		230.0	0	0	0:00	---	---	0	3	19:12	0	3	19:12	99.8	99.8	99.8	99.8	99.8	
	BASIC	230.0	0	0	0:00	---	---	0	5	21:24	0	5	21:24	99.8	99.8	99.8	99.8	99.8	
PAI	GLYTHE	154.0	0	1	464:00	TRQ	TRQ	0	0	0:00	0	1	464:00	94.7	94.7	94.7	94.7	94.7	
	BUCKEYE	34.5	9	1	1:08	LIG	LIG	10	0	0:00	0	10	1:08	100.0	100.0	100.0	100.0	100.0	
		154.0	0	0	0:00	---	---	0	3	171:19	0	3	171:19	98.0	98.0	98.0	98.0	98.0	
	13.8	0	8	311:26	TRQ	WIN	6	0	0:00	0	8	311:26	96.5	96.5	96.5	96.5	96.5		
	CASA GRANDE	13.8	0	0	0:00	---	---	0	1	0:39	0	1	0:39	100.0	100.0	100.0	100.0	100.0	
	COOLIDGE	115.0	1	1	0:05	EDP	TRQ	2	1	5:17	0	3	5:22	99.9	99.9	99.9	99.9	99.9	
	DAVIS 230 & 69-KV	13.8	0	1	0:02	TRQ	---	---	1	1	50:59	0	2	50:59	99.4	99.4	99.4	99.4	99.4
		69.0	1	0	0:00	LIG	LIG	1	0	0:00	0	1	0:00	100.0	100.0	100.0	100.0	100.0	
	ELEC. DISTRICT NO. 2	110.0	0	0	0:00	---	---	0	1	136:06	0	1	136:06	98.5	98.5	98.5	98.5	98.5	
	ELEC. DISTRICT NO. 4	115.0	0	1	9:37	DEF	DEF	0	0	0:00	0	1	9:37	100.0	100.0	100.0	100.0	100.0	
GILA	69.0	0	2	7:43	DEF	DEF	1	1	0:43	0	3	8:26	99.9	99.9	99.9	99.9	99.9		
		34.5	3	7	466:30	TRQ	TRQ	10	2	8:54	2	12	475:24	94.6	94.6	94.6	94.6	94.6	

IV. Annual Hydroelectric Unit Service Record

Figure 14 shows a partially completed PO&M Report 132. This report provides an annual summary of both operation and maintenance Information for each generation unit, including station service units, in every powerplant; for each combination pumping-generating unit in every pumping- generating plant; and for each pumping unit in pumping plants with total installed capacity of 15,000 horsepower or greater. The report will be prepared in the Denver Office, using ADP procedures, including retrieval of information previously transcribed from monthly forms PO&M-59, -59A, -59B, and -59C.

Copies shall be furnished the Commissioner, Washington Office, and each regional office for distribution as stipulated by the Regional Director. The report shall be completed and available for distribution by the end of January following the reported year.

Following is a brief description of the various items of information provided by this report:

	<u>Item</u>	<u>Description</u>
(1)	Calendar Year	The calendar year which the report is applicable.
(2)	Region	The geographical regions, in which the plants are located.
(3)	Project	The projects of which the plant is part, with projects listed alphabetically within each region, using the approved project codings listed in FIST Volume 4-2 , "Power O&M Codes for ADP."
(4)	Plant	Official name of the plants, arranged alphabetically within each project.
(5)	Unit	The assigned unit number within the plant, arranged in ascending order, with station-service units, if any, listed last.
(6)	Time Operated	Total number of hours the unit was actually rotating for any purpose during the year, expressed decimally in hours, and rounded to the closest tenth.
(7)	Time Available	Total number of hours the unit was in actual service or ready for service during the year, expressed decimally in hours, and rounded to the closest tenth. Not applicable for seasonal pumping plants.
(8)	Availability Factor	Ratio, calculated by the computer, of the Time Available (item 7) to total hours in the year, expressed in percent, and rounded to the closest tenth of 1 percent. Not applicable for seasonal pumping units.

	<u>Item</u>	<u>Description</u>
(9)	Actual Maintenance Time	The total number of hours during the year that maintenance actually was being performed on the unit, expressed decimally in hours, and rounded to the closest tenth.
(10)	Maintenance Factor	Ratio, determined by the computer, of the Actual Maintenance Time (item 9) to the total hours in the year, expressed in percent, and rounded to the nearest tenth of 1 percent.

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HYDROELECTRIC UNIT SERVICE RECORD

CALENDAR YEAR 1981									* SEASONAL POWER PLANT ** SEASONAL PUMPING PLANT	
REGION	PROJECT	PLANT NAME	UNIT	TIME OPERATED (HOURS)	TIME AVAILABLE (HOURS)	AVAILABILITY FACTOR %	ACTUAL MAINTENANCE TIME (HOURS)	MAINTENANCE FACTOR %		
B01	ANDERSON RANCH		01	4334.9	6416.6	73.2	441.2	5.0		
			02	5976.2	6519.0	74.4	280.8	3.2		
			BLACK CANYON	01	7122.7	7322.4	83.5	291.6	3.3	
				02	7409.4	7429.8	84.8	268.5	3.1	
				BOISE RIVER DIV	01	* 3688.1	8760.0	100.0	0.0	0.0
					02	* 3695.3	8760.0	100.0	0.0	0.0
	C08	GRAND COULEE	03	* 2587.8	7957.5	90.8	132.0	1.5		
			01	7719.2	7717.3	88.1	253.1	2.9		
			02	8272.0	8653.4	98.8	29.7	0.3		
			03	8025.1	8635.6	98.6	46.5	0.5		
			04	6738.4	7542.4	86.1	300.8	3.4		
			05	7850.3	8511.7	97.2	57.8	0.7		
C08		06	7920.4	8704.5	99.4	21.5	0.2			
		07	6505.5	7286.6	63.2	372.3	4.3			
		08	7480.4	8039.9	91.8	74.0	0.8			
		09	6710.0	6715.7	76.7	455.3	5.2			
		10	0.0	0.0	0.0	2016.0	23.0			
		11	7378.8	7487.2	85.5	306.2	3.5			
		12	7757.9	7861.9	89.7	229.0	2.6			
		13	8209.8	8335.1	95.1	121.7	1.4			
		14	8625.8	8742.6	99.8	11.4	0.1			
		15	8434.8	8722.3	99.6	18.5	0.2			
		16	8482.8	8741.5	99.8	15.7	0.2			
		17	8265.1	8488.1	96.9	39.9	0.5			
		18	8518.6	8715.0	98.5	26.1	0.3			
		19	6412.1	7019.2	80.1	413.5	4.7			
		20	4312.3	4677.1	53.4	965.5	11.0			
		21	2183.4	2292.9	26.2	1441.5	16.5			
		22	2933.0	3184.0	36.3	634.0	7.2			
		23	1178.1	1391.8	15.9	1079.2	12.3			
24	975.3	1443.1	16.5	1308.2	14.9					
1S	8497.4	8511.9	97.2	69.0	0.8					

C. Individual Event Reports

Various events occur at unexpected or irregular intervals which require the preparation of reports thereon. One such occurrence is the failure of equipment during service or operation, possibly resulting in a forced outage or shutdown. Another would be the observance of damaged or defective equipment discovered either during routine Inspection or as a result of specific investigation prompted by observed or suspected faulty operation. Occurrences of the latter type might necessitate arrangement of scheduled outages to allow repair, removal or replacement of the faulty equipment. Under such circumstances, a comprehensive report on an individual event basis shall be prepared, which is designated the Equipment Trouble Report, form PO&M-124.

Other occurrences requiring preparation of an individual event report are those involving reportable Incidents as defined in [FIST Volume 1-2](#), "Operations and Maintenance Improvement Program." After investigation of each reportable incident by a review board, and preparation of a confidential report thereon for local use, a synopsis of each incident shall be prepared using Form PO&M-171, "O&M Improvement Reporting System." These summaries will be used by the Facilities Engineering Branch, in developing a Reclamation-wide "Annual Report of Power Employee Incidents." This annual report shall serve as a training document to inform O&M personnel of solutions to existing problems, and to impress all personnel with the need for continual awareness and alertness to prevent recurrence of such events.

Following are descriptions of the report forms to be used, and the information to be provided thereon in preparing an Equipment Trouble Report, and a O&M Improvement Reporting System Report:

I. Equipment Trouble Report

Figure 15 is a sample of a properly completed form PO&M-124. Each operating office shall prepare a report of this type for every item of major power equipment or associated auxiliaries which fails in service, or is found damaged or defective. The new "Equipment Trouble Report" was designed for reporting (1) equipment failures, (2) impending failures discovered in the preventive maintenance program, (3) failures not resulting in outages, and (4) other situations. This includes equipment owned by others for which operation and maintenance services are provided by Reclamation. Each report must be accurate and complete so that sufficient data are available for analysis. Certain information in this report is intended for use in ADP applications. The data will be collected by the Denver Office for storage and subsequent retrieval for various purposes. Quantities to be so treated shall be entered in vacant boxes on the right side of the front page of the form.

The report shall be prepared as promptly as circumstances permit and be distributed within 30 days after the trouble is detected. At least three copies shall be forwarded to the Regional Director, two of which shall be sent to the Denver Office, attention: Chief, Facilities Engineering Branch. At least one copy shall be retained in the files of the organization responsible for the maintenance of the equipment in trouble. Other copies shall be sent to offices as designated by the Regional Director. Equipment trouble reports also shall be included in histories of major equipment. Where it appears that the information is of general interest, the Denver Office will advise other concerned and interested regional offices.

When entering information in the boxes for ADP use, a few simple rules must be followed. See "SPECIAL INSTRUCTIONS" in part A, section II of this chapter. For this particular report, only one character (letter or figure) should be placed in any Single box. If the entry requires fewer than the number of boxes provided:

- (a) Start entries which include LETTERS ONLY, or a combination of LETTERS AND FIGURES, with the FAR LEFT box;
- (b) Terminate entries which consist of FIGURES ONLY, with the FAR RIGHT box;
- (c) Leave any UNUSED boxes completely BLANK.

Detailed instructions for reporting on the various items, as they appear in sequence on the form, are as follows:

<u>ADP Fields</u>	<u>Item</u>	<u>Description</u>
(1)	Operating Area (upper right-hand corner)	Insert the name of the Operating Area in which the equipment trouble occurred.
(2)	Date of Report (upper right-hand corner)	Insert the date of the report preparation (year, month, and day, in <u>that specific</u> order).

<u>ADP Fields</u>	<u>Item</u>	<u>Description</u>
(3)	Card	Blocks with this designation appear at two different locations on the form. They each contain preprinted information for ADP use. Do <u>NOT</u> Insert any letter or figure in the empty (fourth) box.
(5-7)	Regional Report No.	The report number is used to identify the data collected with the incident reported. This number shall be assigned on a regional basis by the regional office in consecutive order corresponding to the chronological order of receipt by the regional office, beginning with No. 1 at the start of each calendar year, Review "SPECIAL INSTRUCTIONS" in part A, section II of this chapter, and instructions (a), (b), and (c) above which pertain specifically to this report.
(8-13)	Date of Trouble or Failure	Insert a six-digit number to indicate the date of the trouble occurrence or discovery (<u>YEAR. MONTH. AND DAY</u> in that specific sequence) - e.g., 870409 for April 9, 1987, or 871027 for October 27, 1987.
(14)	Region	The Reclamation geographical region represented by a numerical equivalent; 1 = PN, 2 = MP, 3 = LC, 4 = UC, 6 = GP, in which the faulty equipment was located.
(15-24)	Facility:	
(15-23)	Name and Code	<u>On the line provided. Insert the name of the facility (plant, station, transmission line, etc.) where the faulty equipment was located, and</u> In the vacant blocks at the right, insert the approved code designation for the facility as listed in FIST Volume 4-2 , "Power O&M Codes for ADP." When the facility is a plant or station, with code designation of three characters or less, place the code in the <u>LEFT END</u> group of three vacant boxes. See figure 15 .
(24)	Type	Indicate the "type" of facility (powerplant, switchyard, transmission line, etc.) using the approved single-letter codes listed in section 5.2, "TYPE CODES," of FIST Volume 4-2 .
(25)	Pictures	When the report is supplemented by accompanying pictures, place a "Y" (for "yes") in the box. If pictures are not enclosed, place an "N" ("no") in the box.

<u>ADP Fields</u>	<u>Item</u>	<u>Description</u>
(26)	Correspondence	When the report is forwarded by a transmittal letter which contains additional data, or which requests comments or action by the Denver Office, place a "Y" ("yes") in the box. Otherwise, place an "N" ("no") in the box.
(27-29)	Primary Equipment Involved	Report the <u>primary equipment</u> name on the line provided, and insert the approved code shown in FIST Volume 4-2 . Confine designation of <u>primary</u> equipment to only those items listed in left-hand columns of section 5.3, "PRIMARY EQUIPMENT AND COMPONENT CODES," of FIST Volume 4-2 .
(30-34)	Operating No. or Device Designation	Insert the assigned operating number or device designation of the primary equipment being reported, if one exists.
(35-36)	Year Equipment was Installed	Insert the last two numbers of the calendar year when the primary equipment was installed at that location. In many instances, this information is available from the PLS Listing. In case the equipment had been previously installed at a different location, provide details (where and when) in "Remarks" portion of the form.
(37-40)	Manufacturer	Report the <u>name</u> of the <u>primary</u> equipment manufacturer on the line provided, and insert the corresponding code as shown in section 5.4, "MANUFACTURER'S NAME CODES," of FIST Volume 4-2 .
(41-50)	Type	Insert the manufacturer's designated type of the equipment as indicated on the equipment nameplate. It is essential that any characters such as decimal point, comma, dash, diagonal slash mark, etc., be included in this identification. If the designation has too many characters to fit in the boxes provided, show the type designation in the "Remarks" section.
	Serial No.	On the line provided, insert the serial number indicated on the nameplate of the primary equipment involved, if one exists.
	Rating	Provide applicable basic ratings of the <u>primary</u> equipment (voltage, current, and capacity) as follows:
(51-54)	Voltage	Insert the nominal voltage, <u>in kilovolts</u> . The voltage reported should be placed to fill the <u>right-end</u> boxes, <u>recognizing the decimal point preceding the far-right box</u> ; for example, differentiate between 13.8 for a

ADP
Fields

Item

(51-54)	Voltage (Continued)	motor and 138.0 for a transmission line. For a transformer, report the highest voltage rating. For single phase devices (reactors, power, or instrument transformers) Indicate the nominal three-phase voltage of the circuit to which the device is connected.
(55-58)	Current	Insert the current rating in amperes as shown on the primary equipment nameplate. For multiratio current transformers, insert the rating corresponding to the highest available ratio; for example, a transformer connected 200/5 amps, but with maximum rating of 600/5, would be reported as 600.
	Capacity	
(59-68)	Numerical Value	Indicate the numerical value of the primary equipment capacity, such as 250 or 75000. For equipment with more than a single rating, such as transformers with one or more stages of supplemental cooling, report the largest rating. For instrument transformers, these boxes should be left blank.
(69-72)	Unit of Measurement	Indicate the units in which the capacity is measured (KW, KVA, KVAR, HP, etc.). The rating of generators must be in KW; of pumps, turbines, and motors in HP; of circuit breakers and power transformers in three-phase KVA; of condensers, in three-phase KVAR; and of capacitors and reactors in single phase KVAR.
	Equipment Spec., Inv., or Solicitation Number	Provide the specification, invitation, or solicitation number under which the primary equipment was furnished, if available.
(73-75)	Ownership	Show "WBR," unless equipment is owned by others with O&M provided by Reclamation, in which case indicate ownership using approved codes in section 2.9, "OWNERS, ALL REGIONS," of FIST Volume 4-2 .
(15-17)	Component in Trouble or Failed	Report the name of the faulty component on the line provided, and insert the corresponding approved code indicated in FIST Volume 4-2 . Confine designation of components to only those items listed in the rigid-hand columns of section 5.3, "PRIMARY EQUIPMENT AND COMPONENT CODES," of FIST Volume 4-2 for the <u>specific item of primary equipment being covered by the report.</u>

ADP Fields	Item	Description
(18-20) & (21-23)	Defect or Damage to Component	Two entries are available to indicate the defect or damage to the component. Using one, or if necessary two descriptors to most appropriately describe the nature of the trouble, indicate the defect(s) or damage(s) on the line(s) provided, and insert the corresponding approved code(s) shown in section 5.5, "DEFECT OF DAMAGE TO COMPONENT CODES," of FIST Volume 4-2 . If it appears there is no descriptor and code in section 5.5 of FIST Volume 4-2 to adequately describe the defect or damage, enter the descriptor and code from FIST Volume 4-2 considered closest to the actual condition. Then in the "Remarks" section of the report, suggest a more applicable descriptor and code.
(24-27) & (28-31)	Cause of Trouble or Failure	Two entries are available to indicate the cause of the trouble or failure. Using one, or if necessary two descriptors to most appropriately describe the cause of trouble or failure, indicate the cause on the line(s) provided, and in the three <u>left-end</u> boxes insert the corresponding code(s) shown in section 5.6, "CAUSE OF TROUBLE OR FAILURE CODES," of FIST Volume 4-2 . If the stated cause(s) is definite, leave the fourth box vacant. If the stated cause(s) is uncertain, insert "U" following the regular three- letter descriptor. If it appears there is no descriptor and code in section 5.6 of FIST Volume 4-2 to adequately describe the cause of trouble or failure, enter the descriptor and code from FIST Volume 4-2 considered closest to the actual condition. Then in the "Remarks" section of the report, suggest a more applicable descriptor and code.
(32)	Outage Involvement	Use one of the five single-letter codes listed in section 5.7, "OUTAGE INVOLVEMENT," of FIST Volume 4-2 , to indicate whether a power system outage occurred, if so what type, and whether any interruption to customer service resulted from the equipment failure or discovery of the faulty condition.
(33)	Disposition of Faulty Component	Using codes listed in section 5.8, "DISPOSITION OF FAULTY EQUIPMENT," in FIST Volume 4-2 , insert in the box the appropriate code describing the disposition of the faulty component.
	Remarks	Include reference to any replacements used, and observations on condition of equipment. Use extra sheets when necessary. In the event it is believed that none of the descriptors included in sections 5.5

<u>ADP Fields</u>	<u>Item</u>	<u>Description</u>
	Remarks (Continued)	or 5.6 of FIST Volume 4-2 are adequate to properly describe the defect or damage to a component, or the cause of trouble or failure, a notation to that effect may be included in the "Remarks" section, and a new descriptor and code suggested. After review, FIST Volume 4-2 may be expanded to include additional descriptors and codes.
	Narrative Report and Recommendations	The narrative portion of the report, on the reverse side of the sheet, should set forth circumstances and actions or observations before, during, and after the trouble, with recommendations, if any, to prevent recurrence.

NARRATIVE REPORT AND RECOMMENDATIONS: On Wednesday, April 27, at 1630-received 250 VDC ground, day shift reported having trouble with N3-4 CO2 system so we proceeded to test N 3-4 CO2 system to see if the ground was in that system. Upon killing power the ground fault cleared and in the process of restoring CO2 the test meter showed voltage present to our initial discharge valve. With this voltage we could not turn CO2 back on to Unit N-4 and with the recent problem with N-3 still being evaluated it was deemed we could not take a chance running N-4 without CO2 protection so we declared N-4 unavailable at 1755 on 4-27-88. N-4 was returned to service at 2030 on 4-27-88.

No recommendation.

SIGNED S. Honey

USE ADDITIONAL SHEETS IF REQUIRED

II. O&M Improvement Reporting System

Figure 16 is a sample of a properly completed form PO&M-171. The summary report shall be prepared and distributed within 30 days after completion of the confidential report. It must be concise and complete to provide for meaningful study and discussion of the Incident. One copy of the report shall be provided the Project Operation Services, Code D-5140, Denver Office; and one copy shall be forwarded to the Chief, Facilities Engineering Branch, Code D-5210, Denver Office.

Detailed instructions for reporting on Items, as they appear in sequence on the form, are as follows:

<u>Sequence</u>	<u>Item</u>	<u>Description</u>
(1)	Region	Region in which the incident occurred.
(2)	Report No.	Regional report number.
(3)	Date	Date of incident.
(4)	Time	Time of incident.
(5)	Type of Report	Indicate with an "X" the type of report
(6)	Function Being Performed	Indicate with an "X" the function being performed at the time of the incident. This Is not necessarily the employees job classification.
(7)	Result of Incident	Indicate with an "X" the appropriate item or items defining the result of the Incident.
(8)	Cause of Incident or condition	Indicate with an "X" the appropriate item or items defining the cause of the incident or condition.
(9)	Narrative Description of Incident or Condition	<p>A narrative summarization of the incident including:</p> <p>(a) Events leading up to the incident, with remarks on time available to accomplish required procedure, stress, disturbing or distracting factors, etc.</p> <p>(b) Consequences, such as injuries, damage, service impairment, etc.</p> <p>(c) Restoration of service.</p>
(10)	Consequences	Narrative explanation of the cause(s) of the incident

<u>Sequence</u>	<u>Item</u>	<u>Description</u>
(11)	Recommendations	Statement of solutions recommended in light of causes identified. Omit any reference to reprimands or penalties recommended or Imposed.

(Further guidelines for this report are given in [FIST Volume 1-2](#), "Operations and Maintenance Improvement Program"

O&M IMPROVEMENT REPORTING SYSTEM

REGION:	REPORT NO.:	DATE: (Mon./Day./Year)	TIME:
---------	-------------	------------------------	-------

TYPE OF REPORT: (Check One)		FUNCTION BEING PERFORMED: (Check One)	
Operating Incident	<input type="checkbox"/>	Operations	<input type="checkbox"/>
Design Problem	<input type="checkbox"/>	Maintenance	<input type="checkbox"/>
Installation Problem	<input type="checkbox"/>	Installation	<input type="checkbox"/>
Equipment Malfunction	<input type="checkbox"/>	Construction	<input type="checkbox"/>
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>

RESULT OF INCIDENT (Check Appropriate Item or Items)	
Incident Definitions:	
Endangered the life or wellbeing of any person	<input type="checkbox"/>
Caused damage to, or failure of, equipment	<input type="checkbox"/>
Caused an unintentional system or equipment outage	<input type="checkbox"/>
Caused incorrect operation of equipment	<input type="checkbox"/>
Inadvertently caused an abnormal or dangerous operating condition	<input type="checkbox"/>
Failed to act when the need for action was indicated	<input type="checkbox"/>
Violated a rule, standard practice, or standing operating procedure	<input type="checkbox"/>
Caused the incorrect formulation or execution of a switching order	<input type="checkbox"/>
Undesired operation due to incorrect equipment installation, maladjustments, or design deficiencies	<input type="checkbox"/>
Undesired operation due to mechanical failure of equipment or tools	<input type="checkbox"/>

CAUSE OF INCIDENT OR CONDITION (Check Appropriate Item or Items)	
Lack of attention	<input type="checkbox"/>
Failure to follow a proper procedure	<input type="checkbox"/>
Lack of communication	<input type="checkbox"/>
Unfamiliar with equipment	<input type="checkbox"/>
Unfamiliar with operating procedures	<input type="checkbox"/>
Poor documentation	<input type="checkbox"/>
Improperly prepared procedure	<input type="checkbox"/>
Congested area	<input type="checkbox"/>
Under pressure	<input type="checkbox"/>
Poor design	<input type="checkbox"/>
Improper equipment	<input type="checkbox"/>
Carelessness	<input type="checkbox"/>
Improper installation	<input type="checkbox"/>
Other (Explain below)	<input type="checkbox"/>
<hr/> <hr/> <hr/>	

Copy to: D-5200, Regional Office

(Over)

FIGURE 16 (FRONT)

[illegible]

CONSEQUENCES:

RECOMMENDATIONS:

3. RECORDS

A. Plant and Station Logs

Records of all system operations shall be maintained at each attended or remotely controlled powerplant, designated major pumping plant, pumping- generating plant. At part-time attended facilities, records shall be kept for the period of attended operation. At unattended facilities, records shall cover each visit to the facility.

A logged record shall be maintained either by the dispatchers, operators, or switchmen on duty. At some locations, portions of the information will be available from automatic recording and monitoring equipment. Specific data may vary in form and content to fit the needs and conditions of Individual plants or stations. In general, the data shall include information on loading, voltage, temperatures of major facilities, water elevations and discharges, transmission line disturbances, outages, clearances, etc., to provide a continuing record of operation for future reference, as well as clues to the possible cause of equipment trouble or abnormal operating conditions.

When automatic recording and monitoring equipment is not provided, and to supplement such Information, a plant or station log shall be maintained in a bound book. A sample page from a bound Operating Log (form 7-1623) is shown in [figure 17](#). This book is applicable for use in attended, part-time attended, or unattended plants or stations. [Figure 18](#) shows sample pages from bound Operating Log (form 7-1679) which may be more appropriate for use at certain facilities.

All entries in the bound log books shall be made in ink or other indelible writing material. Corrections shall not be made by erasure or use of ink eradicators. However, errors may be lightly crossed out so the incorrect notation is still legible, and the correct entry added. The log shall contain a chronological record of all important events such as starting and stopping of machines, switching operations, issuance and release of clearances, operation of outlet works or spillways, trouble experience, etc. The logging of clearances issued or released shall be in compliance with FIST Volume 1-1 "Power System Clearance Procedure". Switching Program Forms shall be considered part of the station log, and shall be accessible at all times, except when in use in the performance of switching operations.

Routine Information, not obtainable from instrument charts or centralized data logging facilities, shall be recorded on separate log sheets for selected intervals, as required.

At the end of each 24-hour operating period, the daily records should be reviewed and signed by the supervisor of station operators. The records should be filed in the local office and kept for a minimum of 10 years.

At unattended stations, log entries shall indicate the date and time of each visit; describe any unusual conditions observed or nonroutine work performed; record Information from automatic equipment such as relay targets, operation counters on circuit breakers or voltage regulating devices, etc.; and be signed by the person making the entry.

OPERATING LOG		POSITION	OPERATORS		
			12-4 SHIFT	4-4 SHIFT	4-12 SHIFT
DAY MONTH TO					
DATE ¹	TIME (Hour)	ENTRIES			
<p>NOTE — Make all entries in ink. Line out and initial all errors.</p> <p>¹For operations requiring small number daily entries use one sheet for several days and insert tabs in this column.</p>					
REVIEWED (Signature of Supervisor in Charge)					

SAMPLE PAGE FROM BOUND OPERATING LOG (Form 7-1623).

TRANSFORMER BANKS

DATE	TIME	NO. 1		NO. 2		NO. 3	
		OIL TEMPERATURE	GAS PRESSURE	OIL TEMPERATURE	GAS PRESSURE	OIL TEMPERATURE	GAS PRESSURE

VOLTAGE REGULATORS

CIRCUIT BREAKERS

NO. 1					NO. 2					NO.		NO.	
OIL TEMP.	COUNTER READING	RANGE			OIL TEMP.	COUNTER READING	RANGE			COUNTER READING	COMPRESSOR HR. METER	COUNTER READING	COMPRESSOR HR. METER
		HI	PRES	LO			HI	PRES	LO				

CIRCUIT BREAKERS

NO.		NO.		NO.		NO.		NO.	
COUNTER READING	COMPRESSOR HR. METER	COUNTER READING	COMPRESSOR HR. METER	COUNTER READING	COMPRESSOR HR. METER	COUNTER READING	COMPRESSOR HR. METER	COUNTER READING	COMPRESSOR HR. METER

SAMPLE PAGES FORM BOUND OPERATING LOG (Form 7-1679).

WATTHOUR METERS

[illegible]

SAMPLE PAGES FORM BOUND OPERATING LOG (Form 7-1679).

B. Beading of Revenue Meters

Readings shall be made at least monthly of all revenue meters, and the records retained for at least 6 years. A sample of Meter Reading form DI- 34, properly filled out to indicate deliveries of power and energy to a Reclamation customer, is shown in [figure 19](#). This form, or a suitable alternate approved by the Regional Director, shall be used for recording all monthly billing meter readings.

RECORD OF METER READINGS

DI-84

Form approved by Controller General, U.S.
January 16, 1934

UNITED STATES DEPARTMENT OF THE INTERIOR

RECORD OF METER READINGS FOR THE YEAR 1950

BUREAU OR OFFICE Reclamation
Parker Dam Power Project Phoenix, Arizona
 (Project) (Location)

CONSUMER Yuma Irrigation District
Yuma, Arizona Wholesale
 (Address) (Service)

DATA	WATT-HOUR METER	DEMAND METER
Location	<u>Gila Substation</u>	<u>30-minute</u>
Manufacturer	<u>General Electric</u>	<u>integrating demand</u>
Serial No.	<u>16634106</u>	<u>attachment on the</u>
Ampere	<u>5</u>	<u>meter at left</u>
Volts	<u>115</u>	
Wire	<u>3</u>	
Installed	<u>July 10, 1943</u>	
Tested	<u>May 23, 1950</u>	
Multiplier	<u>833-1/3 *</u>	

METER READINGS								REMARKS
MO.	KW.-HR. DIAL READINGS				KW.-HRS. USED	DEMAND READINGS	KW. DEMAND	
Dec.	4	5	4	3	427,500	1.2	1,000	
Nov.	4	0	3	0	541,667	1.4	1,167	
Oct.	3	3	8	0	674,167	1.6	1,333	
Sept.	2	5	7	1	586,667	1.6	1,333	
Aug.	1	8	6	7	350,000			*C.T. ratio changed New mult. 833-1/3
	1	4	4	7	147,800	1.42	1,183	
July	0	7	0	8	386,000	4.8	960	
June	8	7	7	8	587,200	5.9	1,180	
May	5	8	4	2	557,800	6.3	1,260	
Apr.	3	0	5	3	683,400	6.4	1,280	
Mar.	9	6	3	6	604,800	6.3	1,260	
Feb.	6	6	1	2	478,400	5.8	1,160	
Jan.	4	2	2	0	429,400	5.0	1,000	
Dec. of prev. yr.	2	0	7	3				

C. Turbine-Generator Unit Performance

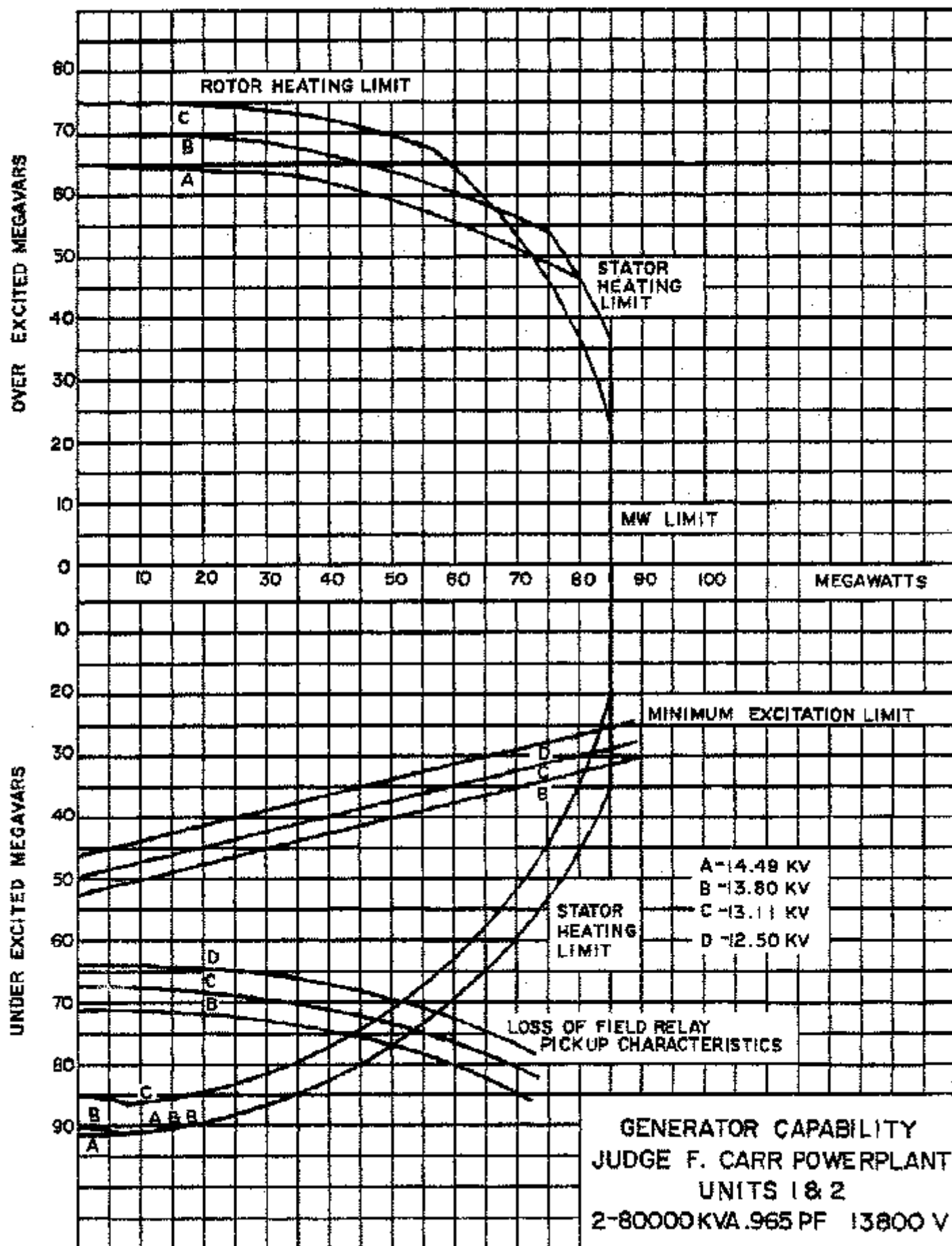
The curves shown in [figure 20](#) show typical performance data of the type available for most Reclamation hydroelectric units. These curves provide basic data for scheduling loading on hydrounits to obtain desired water releases and electrical generation with optimum efficiency.

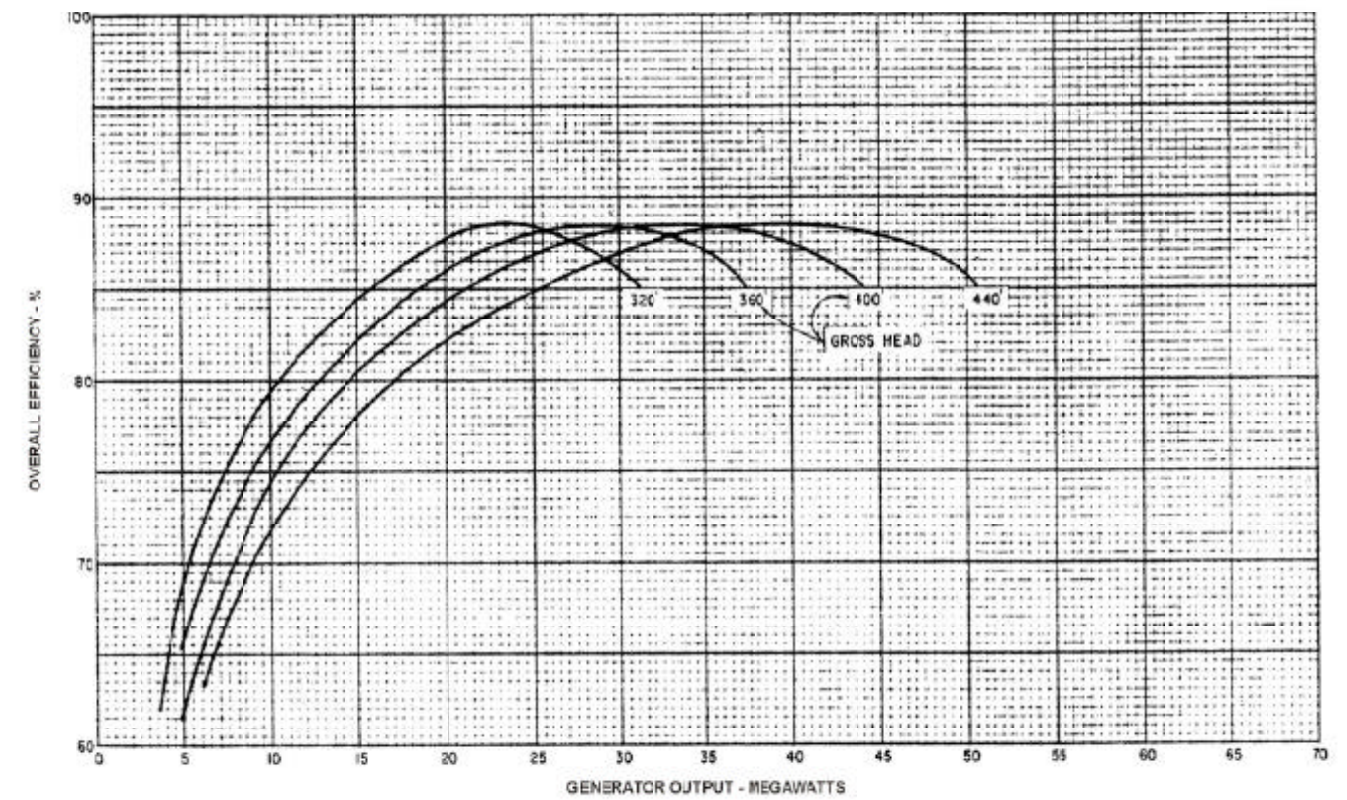
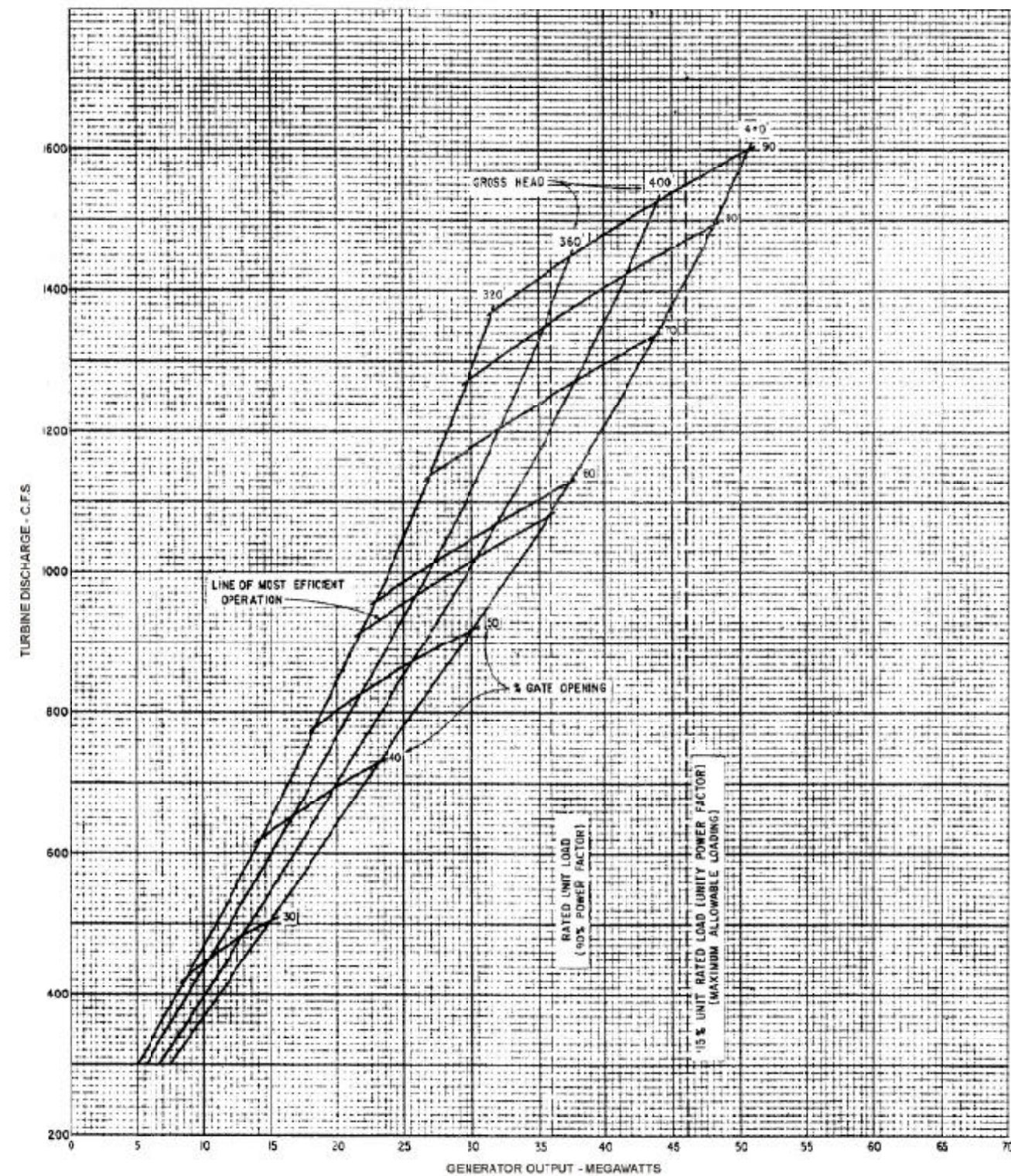
Unit performance data for one specific hydraulic head are determined from Gibson or salt-velocity tests which are usually performed at a new installation as part of the hydrounit acceptance tests. Data for other hydraulic heads, within a plus or minus 10 percent range of the Gibson or salt-velocity test head, are computed by extrapolation formulae to provide a family of curves. Since extrapolation for heads beyond a plus or minus 10 percent range usually produces appreciable error, measurements, are made at other heads outside this range, to provide additional data from which to extend the head range, using the same extrapolation method, until the entire operating head range of the unit has been covered.

In lieu of a family of curves, the performance data also can be made available in tabular form as shown in tables I and II.

In some Operating Areas, personnel have found that the data presented in that form are more convenient for day-to-day operating purposes.

Reasonable accuracy in the collection of test data and performance of the related extrapolation ordinarily will produce results within plus or minus 2 percent accuracy for the head range covered, whether the data are presented in curve or tabular form.





- NOTES
1. Gross head equals difference between forebay elevation and tailrace elevation.
 2. Curves based on Gibson test data of January 1966, at Gross Head of 398 feet.

ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION	
COLORADO RIVER STORAGE PROJECT	
FLAMING GORGE POWER PLANT	
UNIT NO. 3	
PERFORMANCE CURVES	
DRAWN: ADP	SUBMITTED: <i>[Signature]</i>
TRACED: R.S.	RECOMMENDED: <i>[Signature]</i>
CHECKED: 1	APPROVED: <i>[Signature]</i>
DENVER, COLORADO, MAY 18, 1967	
591-D-1393	

FIGURE 21

TABLE I

SAMPLE OF TABULATED TURBINE-GENERATOR UNIT
PERFORMANCE DATA - OUTPUT IN MEGAWATTS

YELLOWTAIL POWERPLANT
OUTPUT WITH ONE UNIT - FULL GATE

JULY 22, 1968

HEAD IN FEET	CFS	MEGA- WATTS	HEAD IN FEET	CFS	MEGA- WATTS	HEAD IN FEET	CFS	MEGA- WATTS
370.	1994.	53.90	410.	2100.	62.87	450.	2200.	72.30
371.	1997.	54.12	411.	2102.	63.10	451.	2202.	72.54
372.	2000.	54.34	412.	2105.	63.33	452.	2204.	72.78
373.	2003.	54.56	413.	2107.	63.57	453.	2207.	73.02
374.	2005.	54.78	414.	2110.	63.80	454.	2209.	73.26
375.	2008.	55.00	415.	2112.	64.03	455.	2212.	73.50
376.	2011.	55.22	416.	2115.	64.26	456.	2214.	73.75
377.	2013.	55.44	417.	2117.	64.49	457.	2217.	73.99
378.	2016.	55.66	418.	2120.	64.72	458.	2219.	74.23
379.	2019.	55.88	419.	2122.	64.96	459.	2221.	74.48
380.	2021.	56.10	420.	2125.	65.19	460.	2224.	74.72
381.	2024.	56.32	421.	2128.	65.42	461.	2226.	74.96
382.	2027.	56.54	422.	2130.	65.65	462.	2229.	75.21
383.	2029.	56.77	423.	2133.	65.89	463.	2231.	75.45
384.	2032.	56.99	424.	2135.	66.12	464.	2234.	75.70
385.	2035.	57.21	425.	2138.	66.36	465.	2236.	75.94
386.	2037.	57.44	426.	2140.	66.59	466.	2238.	76.19
387.	2040.	57.66	427.	2143.	66.83	467.	2241.	76.43
388.	2042.	57.88	428.	2145.	67.06	468.	2243.	76.68
389.	2045.	58.11	429.	2148.	67.30	469.	2246.	76.92
390.	2048.	58.33	430.	2150.	67.53	470.	2248.	77.17
391.	2050.	58.55	431.	2153.	67.77	471.	2250.	77.42
392.	2053.	58.78	432.	2155.	68.00	472.	2253.	77.66
393.	2056.	59.00	433.	2158.	68.24	473.	2255.	77.91
394.	2058.	59.23	434.	2160.	68.48	474.	2257.	78.16
395.	2061.	59.46	435.	2163.	68.71	475.	2260.	78.40
396.	2063.	59.68	436.	2165.	68.95	476.	2262.	78.65
397.	2066.	59.91	437.	2168.	69.19	477.	2265.	78.90
398.	2069.	60.13	438.	2170.	69.42	478.	2267.	79.15
399.	2071.	60.36	439.	2173.	69.66	479.	2269.	79.40
400.	2074.	60.59	440.	2175.	69.90	Nameplate Capability = 82.50 Megawatts 115% Nameplate = 94.88 Megawatts		
401.	2076.	60.82	441.	2177.	70.14			
402.	2079.	61.04	442.	2180.	70.38			
403.	2082.	61.27	443.	2182.	70.62			
404.	2085.	61.50	444.	2185.	70.86			
405.	2087.	61.73	445.	2187.	71.09			
406.	2089.	61.96	446.	2190.	71.33			
407.	2092.	62.19	447.	2192.	71.57			
408.	2094.	62.41	448.	2195.	71.81			
409.	2097.	62.64	449.	2197.	72.06			

PRELIMINARY - COMPUTED FROM GIBSON TESTS
SUBJECT TO VERIFICATION BY INDEX TESTS

TABLE 11

SAMPLE OF TABULATED TURBINE-GENERATOR UNIT
PERFORMANCE DATA - DISCHARGE IN CFS

YELLOWTAIL POWERPLANT
TURBINE DISCHARGE IN CFS - ONE UNIT

JULY 22, 1968

MEGA- WATTS	HEAD IN FEET									
	370	371	372	373	374	375	376	377	378	379
	DISCHARGE IN CFS									
13.	577.	576.	576.	575.	574.	574.	573.	572.	572.	571.
14.	603.	604.	603.	602.	602.	601.	600.	599.	599.	598.
15.	632.	631.	630.	630.	629.	628.	627.	626.	626.	625.
16.	661.	660.	659.	658.	657.	656.	655.	654.	653.	652.
17.	690.	689.	688.	687.	685.	684.	683.	682.	681.	680.
18.	719.	718.	717.	715.	714.	713.	712.	711.	710.	709.
19.	748.	747.	746.	744.	743.	742.	741.	740.	738.	737.
20.	778.	777.	775.	774.	773.	771.	770.	769.	767.	766.
21.	808.	806.	805.	803.	802.	801.	799.	798.	796.	795.
22.	838.	836.	835.	833.	831.	830.	829.	827.	826.	824.
23.	868.	866.	865.	863.	861.	860.	858.	857.	855.	854.
24.	898.	897.	895.	893.	891.	890.	888.	886.	885.	883.
25.	929.	927.	925.	923.	921.	920.	918.	916.	914.	913.
26.	960.	958.	956.	954.	952.	950.	948.	946.	944.	943.
27.	991.	989.	987.	985.	983.	981.	979.	977.	975.	973.
28.	1022.	1020.	1017.	1015.	1013.	1011.	1009.	1007.	1006.	1003.
29.	1054.	1051.	1049.	1047.	1045.	1042.	1040.	1038.	1036.	1033.
30.	1086.	1083.	1081.	1079.	1076.	1074.	1071.	1069.	1067.	1065.
31.	1118.	1115.	1113.	1110.	1108.	1105.	1103.	1100.	1098.	1096.
32.	1150.	1148.	1148.	1142.	1140.	1137.	1135.	1132.	1130.	1127.
33.	1182.	1180.	1177.	1174.	1172.	1169.	1166.	1164.	1161.	1159.
34.	1215.	1212.	1209.	1207.	1204.	1201.	1198.	1195.	1193.	1190.
35.	1248.	1245.	1242.	1239.	1236.	1233.	1230.	1227.	1225.	1222.
36.	1280.	1277.	1274.	1271.	1268.	1265.	1263.	1260.	1257.	1254.
37.	1314.	1311.	1307.	1304.	1301.	1298.	1295.	1292.	1289.	1286.
38.	1348.	1344.	1341.	1338.	1334.	1331.	1328.	1324.	1321.	1318.
39.	1382.	1378.	1375.	1371.	1368.	1364.	1361.	1358.	1354.	1351.
40.	1417.	1413.	1409.	1406.	1402.	1398.	1395.	1391.	1387.	1384.
41.	1452.	1448.	1444.	1440.	1437.	1433.	1429.	1425.	1422.	1418.
42.	1488.	1484.	1480.	1475.	1471.	1467.	1464.	1460.	1454.	1452.
43.	1524.	1520.	1516.	1512.	1507.	1503.	1499.	1495.	1491.	1487.
44.	1561.	1556.	1552.	1548.	1543.	1539.	1535.	1531.	1526.	1522.
45.	1598.	1594.	1589.	1584.	1580.	1575.	1571.	1566.	1562.	1558.
46.	1636.	1631.	1626.	1622.	1617.	1612.	1608.	1603.	1598.	1594.
47.	1676.	1670.	1665.	1660.	1654.	1649.	1645.	1640.	1635.	1630.
48.	1717.	1711.	1706.	1700.	1695.	1689.	1684.	1678.	1673.	1667.
49.	1758.	1752.	1746.	1741.	1735.	1729.	1724.	1718.	1713.	1707.
50.	1801.	1795.	1788.	1782.	1776.	1770.	1764.	1758.	1753.	1747.
51.	1844.	1837.	1831.	1824.	1818.	1812.	1806.	1800.	1794.	1788.
52.	1893.	1885.	1877.	1870.	1862.	1854.	1848.	1842.	1835.	1829.
53.	1946.	1936.	1927.	1918.	1910.	1903.	1895.	1887.	1880.	1872.
54.		1991.	1981.	1972.	1963.	1954.	1945.	1936.	1927.	1920.
55.							1999.	1990.	1980.	1971.

PRELIMINARY - COMPUTED FROM GIBSON TESTS
SUBJECT TO VERIFICATION BY INDEX TESTS

D. Hourly Load Curves

At certain locations where data from automatic recording or monitoring equipment are not available, or as a supplement to such Information, It may be desirable to maintain a continuing record of loading on certain facilities In the form of Hourly Load Curves. Such facilities might include major transmission circuits, important interconnections with adjacent utilities, individual transformers, etc.

Two standard forms, Nos. 7-1388 and 7-1389, are available for such use. They will permit the plotting of hourly values over a 1-week period, to indicate the full pattern of loading on a facility for normal weekdays, weekends, and a full calendar week. The primary purposes of such curves are to show the full range of loading, illustrate trends, serve as a basis for future predictions, and indicate whether optimum utilization is being made of a particular facility. Preparation of the curves is not mandatory, but their use could prove valuable for the above purposes, and for inclusion in reports where such Information might be required.



United States Department of the Interior
BUREAU OF RECLAMATION
UPPER COLORADO REGION
CRSP POWER OPERATIONS OFFICE
P.O. BOX 1477
PAGE, ARIZONA 86040

IN REPLY
REFER TO GC-100
190.

APR 28 1988

Memorandum

To: Regional Director, Salt Lake City, Utah
Attention: UC-105, UC-320, UC-400, UC-600

From: Power Operations Manager

Subject: Monthly Report of Operations and Maintenance Activities -
March 1988 - Colorado River Storage Project

POWER OPERATIONS OFFICE

Planning continued for the Glen Canyon 25th anniversary celebration. Invitation letters were mailed and security needs were defined and coordinated with the Park Service. Most items appear to be in order for the celebration plans.

A meeting was held with the Park Service to coordinate our efforts for summer guided tours of the dam.

The annual Operations and Maintenance safety meeting was held on March 30. Meeting minutes are available from the Safety Office.

Lynn Carpenter from the Structural Behavior Branch of the Division of Dam Safety made a presentation in Page about the automated plan/structure monitoring system he has been developing for CRSP facilities. Goals were set which show system completion in the Spring of 1989.

CONTRACT FIELD DIVISION

General

Dr. Lynn Cobb, contract psychologist for CONTACT visited the Division on March 2.

The first part of the month was spent preparing for acceptance testing of Unit #1 from Siemens. Balancing and alignment took place prior to energizing. Personnel from the Electric Power Branch in Denver performed setup adjustments on the excitation and regulator system. Supervisors received mandatory EEO training from UC-170 during the month. The new Crystal turbine runner arrived on March 1. The Division Chief and Maintenance Superintendent attended a Power Safety Committee meeting in Salt Lake City on March 31. The Division Chief stayed over a few days to conduct additional Regional Office business. Several companies visited Morrow Point in preparation to submitting a bid on the upgrade work scheduled at the plant.

Operations

Blue Mesa reservoir was at elevation 7461.91 on March 31, with 382,733 acre-feet of water impounded. This represents 46% of live capacity. The Aspinall plants generated 72,420,000 KWH of energy during the month. The Molina plants produced 3,711,000 kWh of energy, using 988 acre-feet of water. There was no water by-passed during the month. Blue Mesa experienced 3 forced outages when WAPA's transmission lines opened. The other plants did not have any forced outages.

Maintenance Branch

Blue Mesa - The work force was again concentrated at the plant. Unit #1 was turned back to Siemens on March 6 for acceptance testing and Unit #2 was taken out of service on March 16 for teardown. Unit #2 was turned over to Siemens on March 21 for uprate. Monthly routine work was completed.

Morrow Point - Routine and monthly PM work was completed. Air compressor #2 was removed from service due to a 50 hp motor failure. The motor was sent out for rewind at a local shop. Unit #1 was down during the week of March 28 for inspection by prospective uprate offerors. Some work was done on the vibration equipment wiring and probe installation.

Crystal - Monthly routine and PM work was completed. Oil line flushing and cleaning was started. New turbine runner was delivered and unpacked. The spare turbine parts were inventoried.

Molina - All routine and PM work was completed. The turbine for the lower plant was airarc'd and ground ready for rewelding. Phone lines were installed in the new office. Gravel was hauled and spread in the lower plant yard. Some ditch work was done along the upper plant roadway.

Technical Support

The Electrical Engineering Technician completed the checkout and startup of Unit #1 at Blue Mesa. Work continued on completing Unit #1 drawings and drawings for Unit #2 rewire. Planning and layout was started on the Molina projects. A new UPS system was ordered for Blue Mesa. A failed battery charger was sent back to the factory for repair.

The EEH assisted with testing and startup at Blue Mesa. Assistance was given to Page with SCADA problems at Morrow Point and Crystal. Blue Mesa Unit #2 relay testing began. Assistance was also given to WAPA with ACC problems at Morrow Point. The CAD operator continued to turn out drawings related to the rewires at Blue Mesa.

Safety

There were no motor vehicle accidents nor personal injuries during the month. Five toolbox safety meetings were held during March. Subjects covered included: housekeeping, road conditions, rigging, welding, ventilation, PSSS Section 14, and CSS Section 2.1 and 2.4. A safety analysis was discussed on Unit #2 teardown.

APPENDIX A. - Continued

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Personnel

Two tours were given to school groups at Morrow Point. The Facility Maintenance Assistant received NOS training in Durango during the month. She also spent March 31 in Grand Junction on payroll matters.

FLAMING GORGE FIELD DIVISION

Administration

In Warehouse #1, housing items were inventoried, 32 items were added to the Stores system, and two more sets of pallet racking were added. Barbara Wallin from the Regional Office assisted the supply clerk in listing 76 items as excess. GSA sale of pick-up 1-113802 was completed. Supply trips will be made to Vernal on Wednesdays for requisitions received by Monday and items can be picked up at the warehouse. Recruiting for electrician, temporary, and summer positions is in progress. A promotion board to pick candidates to be referred for the Maintenance position at Fontenelle was held. The vendor installation of carpets and blinds is proceeding on an as-needed basis. A rural route mail box has been installed for the receipt of incoming mail by 10:30 a.m. Flaming Gorge now has the responsibility of calculating the bill to the Forest Service and the Central Finance Office has the responsibility of transferring it electronically. A bill was submitted for \$76,000.

Operations

The lake elevation at 12 p.m., March 31, 1988 was 6021.20 feet. The corresponding storage content of 3,020,000 acre-feet is 81% of capacity. The elevation increased 0.12 feet with a corresponding storage change of 5,000 acre-feet. The inflow for the month was 85,150 acre-feet. Total discharge was 80,150 acre-feet, all of which was used for generation. Total generation was 28,594,000 E~H, 15,166,000 KWH less than the previous month.

There were twenty clearances placed and issued this month. All three units were unavailable for one week this month for scheduled maintenance and replacement of the grounding transformers and surge capacitors. There was one unscheduled outage this month on Unit #2 due to a failure of the generator breaker to close. It was found that the operating spring had failed to recharge. This was corrected.

Maintenance

All PM work was completed. The gate indicators for the SCADA-RTU were adjusted and the grounding transformers and surge capacitors were replaced on all three units. The Permanent Magnet Generator (PMG) on Unit #1 was overhauled including all bearings and insulation bushings. Scaffold brackets were installed in the draft Cubes, the governors were checked out, the twin strainers cleaned, and the plug valves greased on all three units and a surface of about 20 square inches on Unit #3 turbine runner was arc aired and rewelded. Louvers were installed in the access doors on the face

APPENDIX A. - Continued

Page 4

of the dam, the security hinges were changed, and spillway access ladder guards were installed. A closed circuit T.V. monitor and a new window were installed in the visitor center for security observation of tourists, and the VCR controls have been changed. The streets were swept and about 30 hours were spent in plowing snow in Dutch John. The rebuilt airport water pump was reinstalled. Housing maintenance began at 125 Second Ave., continues at 109 Third Ave., and was completed at 103 Fourth Ave.

FONTENELLE

Maintenance

All PM work was completed. The Bridget Valley Electric contractor placed new poles so that the 69 KV transmission line can be relocated to allow placement of the concrete curtain for the dam modification. Pontenelle personnel supported the relocation by assisting with the transfer of station service to Utah Power and Light and by operating the standby generator as required, met with regional land use people for two days and did some preliminary work for the moving of some cattle guards, trimmed the trees that were growing into the telephone lines, and installed fluorescent lights in the basement of one residence. The powerplant machine shop was straightened up, an inventory of tools was taken, and replacement tools and stock were requisitioned. The Bureau contractor has been hauling in more rock for the riprap.

Safety

There were no vehicle accidents nor lost time accidents during the month of March. This field division has driven 103,059 miles since the last vehicle accident on January 15, 1987 and has worked 35,603 man hours since the last lost time accident. A General Safety Meeting was held on March 10, 1988 which included a presentation by Officer Sig Bru of the Utah Highway Patrol. A VHS video tape produced by Volkswagen America and provided by the regional office on the topic of drinking and driving has been made available for home viewing. It is directed toward young drivers and those who have viewed it say that it is a good presentation which is well worth watching. Flaming Gorge and Fontenelle are now completely free of all PCB's with the removal of the grounding transformers and surge capacitors.

GLEN CANYON FIELD DIVISION

Administration

Duane Berrier attended a one day meeting at the E&R Center in Denver, Colorado to try for a wrap up of the Westinghouse generator uprate contract for the Glen Canyon units.

Amah Jou attended a one week training class on specification writing, and Ron Johnson attended a two day Harris control user meeting held in Port Collins, Colorado.

APPENDIX A. - Continued

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Richard White attended a one day meeting in Bakersfield, California; the subject was on oil spill on the Colorado River, put on by the Ail American Pipeline Company.

Duane Berrier and Gary Kuhstoss attended the one day Regional Annual Power System Safety Standards Committee Meeting held at the Salt Lake Regional office.

Personnel

Mr. Jeffery Waite, Powerplant Operator, transferred from the Corp. of Engineers in South Dakota co Glen Canyon, reporting for work on March 2, 1988.

Operations

Lake Powell elevation decreased 0.06 feet during the month to 3681.69 with 22,165,000 acre-feet of storage or 88.7% of full capacity. Calculated inflow was 688,310 acre-feet and gross generation was 340,020,000 KWH. Daily average flow passing the dam was 11,263 cfs. Peak load was 1019 MW at 2000 hours on March 28, 1988, and average load for the month was 457 MW.

There was one unscheduled outage and seven switch orders were completed.

Water seepage in the dam increased 68.9 gallons per minute to 2801.7.

Computer Support Branch

Progress continued on SCADA this month, although we are continuing to have software problems with the datalink. Also, RTU development system update which was scheduled to arrive in the beginning of the month has been delayed 6-8 weeks. The contractor has been urged to expend more effort solving the last few critical discrepancies so we can start availability testing without more excessive delays.

The Unit #1 protective relay calibration was completed this month. An improved Solid State camera was tested with the security system but found only to be adequate indoors with lighting. About a week was spent repairing the old PBX, and the requisition for its replacement was issued.

Engineering - Electrical

Work continued on the elevator upgrade contract with Texas Elevator. Parts were ordered for remote read-out in the control room of the visitor center water tank.

Work is progressing well on the visitor center audio-visual room.

Coordination continued with WAPA on moving breaker controls to the switchyard and on unit dropping system changes.

APPENDIX A. - Continued

Page 6

Test blocks for the Page pump energy metering calibration were installed.

A requisition was made for spare parts for General Electric AR-A1 breakers.

Some spare bushings were identified and tagged and WAPA was informed about bushings in the warehouse that are for equipment in the switchyard.

Work continued on bringing electrical drawings up-to-date.

Plans were made to install an alarm switch in the river outlet vault near the machine shop to warn of any leaks there.

Engineering - Mechanical

Unit #1 Seal Rings - The seal ring inserts have been replaced by 0.5 inch weld build-up. The seal ring inserts installed by fasteners in 1984 cracked through the bolt holes. (See Mechanical Engineer's activities reports for January and February 1988.) The finished seal rings by weld build-up basically look like the inserts except there are no fasteners involved and the material is AMPCO Weld Rod #46 which is nickle-aluminum-bronze.

Pistons for hydraulic brakes have been rechromed and assembled.

New Scan-Pac non-asbestos, non-metallic brake shoes have been specified and will be used on Unit #1.

New exciter fan has been specified and purchased for Unit #1.

Heat exchangers (transformer oil coolers) have been installed on all three K1A transformers to solve transformer overheating problems.

Weirs have been installed throughout the dam to replace broken and leaking weirs.

Tailbay access stairs specification and drawing have been prepared and will go out for quote in April 1988.

A new 150-ton crane hook has been installed on the northeast crane. Both 150-ton crane hooks on the east side of powerplant have been replaced due to cracks.

New air conditioning for compressor and electrical areas have been investigated and preliminary design data has been prepared.

Maintenance Crews

Major work during March continued with the welding of Unit #1 seal ring repair, much progress has been made, they have moved to the upper seal ring and are continuing the welding process. Major work continues on the modification of the visitor center projection room, both jobs are to be completed by May 2, 1988.

Other work performed in March included the painting and sandblasting of the ring follower, the painting of the wicket gates, shift ring, and jet tubes, grinding on the interior of the turbine wheel, spring lawn maintenance, minor breaker maintenance, preventive maintenance checks, and minor visitor center, dam and powerplant maintenance.

Safety

Weekly tool box meetings were conducted by the foremen with their crews. The subjects that were covered include:

Be a safe boater; boating season has started and there are many people on the lake drinking and having a good time.

Know the machinery you are operating. A complete check should be done before operation starts.

Use proper lifting procedures to prevent injury to you or someone else.

Be careful when around welding as the flash could cause injury to the eyes.

Clean your work area after you are finished.

Hands-on fire extinguisher training. Used CO2 and Halon for comparison.

Use grounding strap while working close to the power lines.

Wear safety glasses while doing any kind of grinding work.

Report any hazardous situations to your supervisor so they can be corrected as soon as possible.

Transformer clearance, make sure the clearance is what you want. Check the grounds, etc.

Request any clearance you feel you need. Do not open the PT cubicle without de-energizing the circuit. Control circuits can be turned off and tagged using danger tags. Notify operations if you changed status of the pumps.

Discuss the clearance on K1A and grounding procedures.

Bomb threats, telephone procedures, evacuation, and shutdown procedures were all discussed.

Boring bar, welding, and grinding hazards in the turbine.

When starting a project, make list of materials you will need before going to the job site.

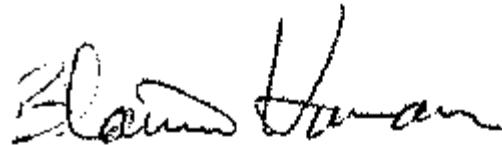
Vehicles should be inspected before using. Check oil, gas, water, and tires; it only takes a minute and could prevent major damage.

Discussed accidents that have happened on the project and ways to eliminate them.

There were no reportable accidents for the month of March.

Glen Canyon Dam personnel have worked 120,249 manhours since the last reportable accident.

Glen Canyon Dam personnel have driven 38,507 miles since the last reportable accident.



Attachment

cc: Chief, Division of Power O&M Technical Services, B&R Center
Attn: D-600 (w/encl)
Chief, Water and Land Technical Services B&R Center
Attn: D-450 (w/encl)
Chief, Flaming Gorge Field Division, Dutch John, Utah (w/encl)
Chief, Curecanti Field Division, Montrose, Colorado (w/encl)
Chief, Glen Canyon O&M Division (w/encl)

APPENDIX A. - Continued

P O M M S A C T I V I T I E S

Colorado River Storage Project

March 1988

FLAMING GORGE FIELD DIVISION

Everything is working satisfactorily. Nine new special work orders have been initiated and five have been completed this month.

GLEN CANYON O&M DIVISION

Routine work continued in the POMMS office, with the April work planning meeting for supervisors held on March 24, 1988.

Twenty-one trouble reports and work requests were completed in March with twenty-seven reports still outstanding.

April PM packets were distributed to all the foremen. Work on Unit #1 is still in progress with an estimated completion date of May 2, 1988.

The following Special Work Orders were added to the schedule for March:

G8041 PAINT HANDRAILS 7 LADDERS/PP/DAH/TUNNEL
G8043 INSTALL SAFETY RAILING/SECURITY CAMERA
G8044 INSTALL TRANSDUCERS/CCH-REAR OF CONTROL ROOM
G8045 REPLACE GASKETS 230 KV SPARE UNIT TRANSFORMER
G8046 UNIT #8/CHANGE BEARING TEMPERATURE SLEEVES
G8047 INVESTIGATE WAREHOUSE ELECTRICAL FACILITIES
G8049 INSTALL VENTILATION TO WORK AREA BEHIND ELECTRICAL SHOP
G8050 INSPECTOR/LIQUID WASTE STORAGE FACILITY

APPENDIX B. - Continued

POWER SYSTEM SUMMARY REPORT

PROJECT FIELD DIVISION

Month Year

A. GENERAL OPERATIONS

The plant was operated with an average release of 603 cfs through the month. Unit 5 was operated at full load during the first half of the month, and Unit 1 the second half. Unit 4 was used to generate partial days. The gross generation was 1,245,000 kWh for the month, with a peak hourly output of 2,800 kWh.

No line outages occurred during the month.

The operating staff issued a total of five clearances, hotline orders, and switching programs during the month.

The reservoir level remained fairly constant through the month at elevation 4239.79. The total average flow was 603 cfs, all of which was used for generation.

The mean average temperature for the month was 33.7 OF, with a low of 9 OF on 5th of the month and a high of 60 OF on 29th day of the month. Precipitation for the month totaled only .13 inch, with .06 inch recorded on 18th day of the month.

B. POWERPLANT AND SWITCHYARD MAINTENANCE

All daily, weekly, and monthly maintenance items were completed.

Continued testing irrigation pump kilowatt-hour meters, which were due for maintenance.

Unit 2 governor was repaired during the month. The governor acted erratically and hunted whenever we attempted to synchronize to the line. The dashpot was disassembled and examined. Several new parts had to be manufactured, including the main dashpot piston. After repair, the governor is operating normally.

Unit 7 was returned to service after sandblasting and painting of the scroll case, draft tube, and runner. Corrective maintenance was performed on runner and discharge cone with molecular metal. All electrical and mechanical maintenance items were performed, and the unit was cleaned. The unit was ramp tested. Governor pump-up time was dramatically improved by rebuilding the check valve on the pressurized governor oil pipeline.

APPENDIX B. - Continued

Unit 5 was removed from service on 24th of the month. The rotor was pulled and cleaning is commencing. A small section of the stator winding is being coated with new insulating varnish to see if we can control the amount of oil oozing from the coils. If the test is successful, we will coat the entire winding during the next maintenance period. The upper guide bearing was removed and large new cracks were observed in the babbitt. The spare bearing was removed from storage, and is being sent to a machine shop for boring and cutting oil grooves into the babbitt.

C. MISCELLANEOUS MAINTENANCE

Remodeling of the Office Building lobby is continuing. At the end of the month, all new walls have been installed, trim is finished, and painting is beginning. The utility room is complete.

The maintenance crew began the repair of the North Side Canal on 23rd of the month. The ice in the canal had built up to 18 inches thick and the first step was to remove an area of ice to work in. The work area was lined with sandbags, and pumped dry. Excavation of the defective concrete is proceeding.

D. PERSONNEL CHANGES

No personnel changes this month.

E. SAFETY

No accidents occurred during the month.

The monthly safety meeting was held on the 26th of the month. Discussion centered on fire extinguishers and piezometer well readings during the inclement weather.

F. TRAINING

Powerplant Operators received a total of 37 hours of training on various subjects during the month.

G. NOTABLE OCCURRENCES

A promotion panel was convened to consider the candidates for the Facility Manager position on the project.